Energy Efficiency & Renewable Energy

Enclosure List of documents received from Energy Efficiency and Renewable Energy (EE)

1. Letter to Excelentisimo Professor Rafael Pineda Ponce, Presidente del Congreso Nacional, Congreso Nacional, Su Despacho, from Robert K. Dixon, Ph.D., Deputy Assistant Secretary, Office of Power Technologies, Energy Efficiency and Renewable Energy, dated July 23, 2001. 1 page. (F2001-00630)

2. Letter to Ingeniero Jack Arevalo Fuentes, Diputado del Congreso Nacional y Presidente del la Comision Nacional de Energia, Su Despacho, from Robert K. Dixon, Ph.D., Deputy Assistant Secretary, Office of Power Technologies, Energy Efficiency and Renewable Energy, dated July 23, 2001. 1 page. (F2001-00630)

3. Letter to The Honorable Gustavo Alfaro, Minister of the Presidency, Republic of Honduras, from Dan W. Reicher, Assistant Secretary, Energy Efficiency and Renewable Energy, dated January 18, 2001. 1 page. (F2001-00630)

4. Letter to Mr. Stanley D. Calvery, Team Leader, Wind Energy Program, Office of Wind and Geothermal Technlogies, Energy Efficiency and Renewable Energy, from Craig Christenson, Vice President, Engineering, Enron Wind. 1 page. (F2001-00630)

5. Undated document entitled "Nomination Form, Research Partnership Award." 2 pages. (F2001-00630)

6. E-mail to Robert Thresher from Ralph Blakemore, Director, Advanced Technology, Enron Wind Energy Systems, dated April 8, 2002. Subject: Re: Biographical Information. 2 pages. (F2001-00630)

7. Unsigned letter to Mr. Goldman from Adam S. Umanoff, President and CEO, Enron Wind, dated December 3, 2001. 1 page. (F2001-00630)

8. Letter to Mr. Stanley Calvert, Manager Turbine Research Program, from Susan Jackson, Zond Energy Systems, Inc., dated November 18, 1998. 1 page. (F2001-00630)

9. Letter to Mr. Stanley Calvert, Manager Turbine Research Program, Wind Energy Program, from Susan Jackson, Zong Energy Systems, Inc., dated October 27, 1998. 1 page. (F2001-00630)

10. Letter to Charles D. Case, Esq., Hunton & Williams, from Daniel M. Adamson, Deputy Assistant Secretary, Office of Power Technologies, Energy Efficiency and Renewable Energy, dated June 1, 1999. 1 page. (F2001-00630)

11. Memorandum to Audrey Newman from Chris Bordeauz, USIJI, dated May 12, 1999. Subject: ENRON John Palmisano papers. 1 page. (F2001-00630)

12. Memorandum to Dear Colleague from John Palmisano, Enron International, dated January 8, 1999. Subject: Two Papers Regarding Early Credits for Greenhouse Gases. 1 page. (F2001-00630)

13. Document entitled "What Are The Economic and Environmental Benefits From Early "Crediting"?," dated January 26, 1999. 9 pages. (F2001-00630)

14. Document entitled "A Program to Reward Early GHG Reductions, Center for Clean Air Policy," dated February 17, 1998. 14 pages. (F2001-00630)

15. Undated document entitled "Air Permit Trading Paradigms for Greenhouse Gases: Why Allowances Won't Work and Credits Will." 15 pages. (F2001-00630)

16. Undated document entitled "Environment Briefing, IEA, Establishing a Market in Emissions Credits: A Business Perspective by John Palmisano." 33 pages (68 double sided). (F2001-00630)

17. Letter to Mr. Abel Lopez, Supervisor, Office of Freedom of Information and Privacy Act, from Charles D. Case, Hunton & Williams, dated April 26, 1999. 2 pages. (F2001-00630)

18. Letter to Charles D. Case, Hunton & Williams, from Abel Lopez, Director, FOIA/Privacy Act Division, Office of the Executive Secretariat, dated May 5, 1999. 2 pages. (F2001-00630)

19. Memorandum to Robbie Dooms from Alexander C. Morris, dated May 5, 1999. 1 page. (F2001-00630)

20. E-mail to Carolyn Wallace from Michael McCabe, dated May 31, 2000. Subject: Meeting for David Garman with Enron. 1 page. (F2001-00630)

21. Document entitled "Calendar Entry: Appointment," dated June 5, 2001. Subject: Meet with Hap Boyd (Enron) VP." 1 page. (F2001-00630)

22. Document entitled "Tuesday, June 5, 2001." 1 page. (F2001-00630)

23. E-mail to Lee Otis from David Garman, dated January 28, 2002. Subject: Disclosure of Enron "contact." 1 page. (F2001-00630)

24. Document entitled "Rebuild America Partnership Launch," dated October 24, 2001. 5 pages. (F2001-00630)

25. Undated document entitled "Itinerary, David Garman, G-8 Energy Ministerial, Detroit, Michigan & Desert Sky Wind Turbine dedication, Iran, Texas, May 2-3, 2002." 2 pages. (F2001-00630)

26. Document entitled "Welcome to the Desert Sky Wind Farm Dedication Ceremony," dated May 3, 2002. 36 pages. (F2001-00630)

27. E-mail to #All OIT Fed from Robert Brewer, dated June 12, 2002. Subject: FOIA request. 1 page. (F2001-00630)

28. E-mail to Henry Kenchington from David Salem, dated June 12, 2002. Subject: FOIA request. 1 page. (F2001-00630)

29. E-mail to Hank Kenchington from David Raynor, dated June 12, 2002. Subject: Re: FOIA request - urgent request. 3 pages. (F2001-00630)

30. E-mail to Robbie.Dooms from Bill Choate, dated June 14, 2002. Subject: ChemShow Session with Enron Energy Services Speaker. 1 page. (F2001-00630)

31. Undated document entitled "ChemShow Session 'Energy Efficiency -Reducing Productions Costs' Tuesday, October 23, 9:00 to noon." 1 page. (F2001-00630)

32. Document entitled "Boiler Efficiency vs. Steam Quality The Challenge of Creating Quality Steam Using Existing Boiler Efficiencies." 2 pages. (F2001-00630)

United States Government **Department of Energy**

memorandum

DATE: June 13, 2002

EPLY TO
TTN OF: Robert K. Dixon, EE-10

UBJECT: Overview of Enron Wind Corp. and Departmental Relations

TO: Robbie Dooms, EE-3.2

Copies of several items of correspondence and documents involving Enron Wind Corp. and employees of the Office of Power Technologies are enclosed in response to FOIA #2001-00630.

Enron Wind Corp. is an independently operated and financially successful subsidiary acquired by Enron Corp. in 1998 through purchase of a pioneering U.S. wind energy company, Zond Energy Systems, Inc. of Tehachapi, CA. Zond Energy Systems and its successor Enron Wind Corp. have held several competitively-awarded research and development subcontracts with the National Renewable Energy Laboratory for projects sponsored by the Wind Program in my office. This company has been the leader of the U.S. wind industry and a key successful partner to the Department's efforts in wind energy for most of the last decade.

On May 10, 2002, General Electric Power Systems Division announced its acquisition of the Enron Wind Corp. wind turbine manufacturing, operations, and maintenance service assets, and launch of a new business unit, General Electric Wind Energy. Thus, the Department's continuing activities in wind energy research and development underway with Enron Wind will be carried out with General Electric Wind Energy in the future.

The response information enclosed represents readily available material that I consider clearly responsive to the intent of FOIA #2001-00630. I would also like to ensure proper awareness of the Department's FOIA officials that a substantial quantity of other material relating to the Wind Program's cost-shared partnership activities with Enron Wind Corp., such as proposals, reports, and briefings, are held by staff in this office, as well as the National Renewable Energy Laboratory. We have no reluctance to provide this information if deemed necessary by FOIA officials, subject to a review for acceptability of release under the FOIA exemptions, in particular those relating to corporate proprietary information. That review and duplication effort would likely involve considerable time and expense.

Department of Energy
Washington, DC 20585

July 23, 2001

Excelentísimo
Profesor Rafaèl Pineda Ponce
Presidente del Congreso Nacional
Congreso Nacional
Su Despacho

Excelentísimo Profesor Pineda:

The U.S. Department of Energy is pleased to learn that Decree 9-2001 was recently passed, approving the Honduras Wind Project to be developed by Power Partners Honduras and the Empresa Nacional de Energia Eléctrica, the purchaser of the electricity from the wind project.

We appreciate your efforts with respect to drafting and presenting the decree to Congress, along with overall support for the project itself. The passage of Decree 9-2001 demonstrates your leadership, capability and commitment to promote clean, renewable energy for sustainable growth in Honduras.

It is important that your support for completion of the project continues, in order for renewable energy projects to contribute to the increasing energy demand of Honduras. The Department will continue to follow the projects progress with interest. We are pleased that this project will use the technologically advanced Enron Wind 1.5 MW wind turbine, developed in partnership with the U.S. Department of Energy's National Renewable Energy Laboratory and manufactured in the United States.

Thank you very much for your support.

Sincerely,

Robert K. Dixon

Robert K. Dixon, Ph.D
Deputy Assistant Secretary
Office of Power Technologies
Energy Efficiency and Renewable Energy

Printed with soy ink on recycled paper

1

Department of Energy
Washington, DC 20585

July 23, 2001

Ingeniero
Jack Arévalo Fuentes
Diputado del Congreso Nacional y
Presidente de la Comision Nacional de Energía
Su Despacho

Estimado Diputado Arévalo:

The U.S. Department of Energy is pleased to learn that Decree 9-2001 was recently passed, approving the Honduras Wind Project to be developed by Power Partners Honduras and the Empresa Nacional de Energia Eléctrica, the purchaser of the electricity from the wind project.

We appreciate your efforts with respect to drafting and presenting the decree to Congress, along with overall support for the project itself. The passage of Decree 9-2001 demonstrates your leadership, capability and commitment to promote clean, renewable energy for sustainable growth in Honduras.

It is important that your support for completion of the project continues, in order for renewable energy projects to contribute to the increasing energy demand of Honduras. The Department will continue to follow the project's progress with interest. We are pleased that this project will use the technologically advanced Enron Wind 1.5 MW wind turbine, developed in partnership with the U.S. Department of Energy's National Renewable Energy Laboratory and manufactured in the United States.

Thank you very much for your support.

Sincerely,

Robert K. Dixon

Robert K. Dixon, Ph.D
Deputy Assistant Secretary
Office of Power Technologies
Energy Efficiency and Renewable Energy

Printed with soy ink on recycled paper

Department of Energy
Washington, DC 20585

January 18, 2001

The Honorable Gustavo Alfaro
Minister of the Presidency
Republic of Honduras
Tegucigalpa, Honduras

Dear Minister Alfaro:

I would like to express my strong support for the efforts of Honduras Power Partners, a subsidiary of U.S.-based Enron Wind Corporation to supply wind energy to the Empresa Nacional de Energía Eléctrica (ENEE) from a proposed wind project to be developed in Department Francisco Morazán. I understand that significant progress has been made to finalize the supply contract for this project and all that remains is to work out a few clauses of the contract.

I am concerned, however, that the process appears to have stalled. Despite repeated attempts, representatives of Power Partners Honduras have not been able to contact key people at ENEE to finalize these details. It is my hope that you will look into this matter and help move the contract to completion.

Enron Wind Corporation has recently installed in several countries more than 600 of the 750 kilowatt turbines originally proposed for this project. Development of this turbine was assisted by our National Renewable Energy Laboratory that I have visited several times. I know that this project would make an important contribution to meeting your country's increasing energy requirements, as well as your government's goals in the provision of clean renewable sources for sustainable economic growth.

Sincerely,

Dan W. Reicher
Assistant Secretary
Energy Efficiency and Renewable Energy

cc: Mr. Arevalo Fuentes
Empresa Nacional de Energia Eléctricia

Printed with soy ink on recycled paper

Craig Christenson
Vice President
Engineering-Americas

Enron Wind
13681 Chantico Road
Tehachapi, CA 93561

P.O. Box 1970
Tehachapi, CA 93581
661-823-6742
Fax 661-823-6804
craig.christenson@enron.com

January 24, 2002

Mr. Stanley D. Calvert
Team Leader, Wind Energy Program
Office of Wind and Geothermal Technologies
Energy Efficiency and Renewable Energy
Department of Energy
Washington, DC 20585

Dear Stan,

I would like to convey my deepest appreciation and thanks for the 2001 Office of Power Technologies Research and Development Award which was jointly presented to Ralph Blakemore and me; it was truly an honor. I was extremely disappointed that we were unable to attend the ceremony in Washington in December due to urgent issues that needed our immediate attention and presence elsewhere in the country. Please accept my deepest regrets for our absence.

I truly appreciate the effort of the Department of Energy's Wind Energy Program, which is consistent with Enron Wind's goals and ideals. It is the collective efforts of everyone ... government, private, and public... which will be the key that proves most beneficial to the present and future environment of our world.

Sincerely,

Craig Christenson
Vice President – Engineering

CC:ka

NOMINATION FORM

Research Partnership Award

Name of Program and Project:

Wind Energy Research Partnerships between the National Renewable Energy Laboratory and Enron Wind Corporation

Next-Generation Turbine Development Project, Near-Term Research and Testing Project, and Value Engineered Turbine Project

Type of Agreement: Cost-Sharing Subcontract

Name(s) and address(es) of participants:

Sandy Butterfield, Walt Musial, and Brian Smith
National Renewable Energy Laboratory
1617 Cole Boulevard
Golden, Colorado 80401

Craig Christenson and Ralph Blakemore
Enron Wind Corporation
13000 Jameson Road
PO Box 1910
Tehachapi, California 93561

Cost Shares and time frame: Lab ($21,423K) **Industry** ($9,753K)

Next-Generation Turbine Development Project: 1997 – Present

Near-Term Research and Testing Project: 1998 – Present

Value Engineered Turbine Project: 1992 - 1998

Certification that partnerships meet the following requirements:

Involves a cost-shared agreement with a DOE laboratory	Yes [X]	No [ ]
Has resulted from a competitive selection	Yes [X]	No [ ]
Is substantially supported by DOE Office of Power Technologies funding	Yes [X]	No [ ]

DOE Headquarters Program Manager: Stan Calvert, Team Leader, DOE Wind Energy Systems Program

Contract No.: DE-AC36-99-GO10337

Project Abstract:

Wind energy is experiencing strong growth worldwide. For more than two decades, the U.S. Department of Energy (DOE), through its Wind Energy Systems Program, has sponsored research, testing, and development activities that have helped reduce the cost of wind-generated electricity. In 1980, the cost of electricity from wind systems at good wind sites has been reduced from $0.35/kilowatt-hour (kWh) to between $0.04 and $0.06/kWh today. Although costs have decreased significantly, researchers believe that further improvements could reduce costs an additional 30% to 50%. Working alone, it would take industry a long time to reach these ambitious cost goals. DOE encourages the long-term commitment of funds and research staff through its competitively selected research partnerships with industry. Such partnerships are crucial to developing the technologies that will significantly reduce the cost of wind-generated electricity and, ultimately, expand our domestic renewable energy supply.

Results

The cost-shared Value Engineered Turbine partnership between Enron and NREL resulted in the Z-550 series wind turbine model. The Z-550 was the first wind turbine designed and manufactured by Enron and was the largest wind turbine manufactured in the United States in the mid-1990's. Enron installed over 100 Z-550 turbines worldwide. NREL engineers conducted component and field tests on the Z-550 and the results were used by certification agent Germanischer Lloyd to certify the design. NREL also monitored and verifed the operational performance of 23 Z-550 machines, under the DOE Wind Turbine Verification Program, at two utility wind farms in Texas and Vermont. The experience gained operating the Z-550 wind turbines at these projects in two distinctly different climates were invaluable to Enron in developing its next turbine model, the Z-750.

The cost-shared Near Term Research and Testing partnership between Enron and NREL helped develop the Z-750 series wind turbine model and the value engineered EW 750i model. The Z-750 uses innovative variable speed technology and a larger rotor diameter – these improvements led to lower costs and better performance and reliability. Enron installed more than 600 Z-750 turbines worldwide. The improved EW 750i turbine reduced the turbine's cost of energy by about 20%. By the end of 2001, 150+ units of the EW 750i turbine are planned for installation in Spain. NREL engineers have conducted blade and drivetrain component tests on this turbine model at the NWTC. They have also evaluated the turbine design and conducted power performance, power quality, structural loads, noise and dynamic characteristic certification tests in the field. Reports from the design evaluation and field tests are being used by UL to certify the EW 750i turbine design. NREL is also monitoring and verifying the operational performance of 5 Z-750 machines, under the DOE Wind Turbine Verification Program, at two utility distributed generation wind projects in Iowa and Nebraska. The experience gained operating the Z-750 wind turbines at these two projects has been valuable to Enron and NREL in better understanding how wind turbines work in small clusters connected to a utility distribution line. NREL is also monitoring the performance of a 100 MW wind farm (133 Z-750 turbines) in Minnesota to better understand how power output from a large wind plant integrates into a utility transmission system.

The cost-shared Next-Generation Turbine Development partnership between Enron and NREL resulted in Enron's latest advanced utility-scale model – the EW 1.5 MW series turbine. This model also features variable speed technology, a 65- or 80-meter tower height, and advanced airfoils designed to increase aerodynamic efficiency for the 70.5 meter rotor diameter and reduce the blade's sensitivity to surface roughness. The EW 1.5 is expected to produce electricity for about $0.036/kWh at 6.7 m/s (at a height of 10 meters above ground) wind sites. Enron expects to manufacture approximately 350 EW 1.5 units at its Tehachapi, California facility in 2001 for installation at U.S. projects. NREL engineers are conducting blade and drivetrain component tests on this turbine model at the NWTC. They are also evaluating the turbine design and conducting power performance, power quality, structural loads, and noise certification tests in the field. Reports from the design evaluation and field tests will be used by UL to certify the EW 1.5 turbine design. NREL is also planning to monitor and verify the operational performance of 161 EW 1.5 machines, under the DOE Wind Turbine Verification Program, at an innovative wind/natural gas hybrid project located in Wisconsin, Iowa, and Minnesota. Further development work under Enron's Next-Generation Turbine Development Project is expected to result in an improved wind turbine design that will be capable of producing wind-generated electricity at approximately $0.03/kWh, a 20% cost of energy reduction compared to the EW 1.5 turbine.

Enron has applied for and received several U.S. patents while carrying out these turbine development projects. The patents cover the development of new airfoil, variable speed/power electronics, and power quality control technologies.

Each of the above cost-shared public-private partnerships is helping the DOE Wind Energy Systems Program achieve its goal of working with U.S. industry to develop advanced wind technology capable of lowering the cost of wind-generated electricity and expanding our domestic supply of clean, renewable energy. Enron's engineering, manufacturing, project development, construction, and operation activities associated with utility-scale wind turbines and power plants adds to the U.S. manufacturing base, creates jobs in the U.S., and increases the capacity of wind-generated energy in the United States and worldwide.

Ralph.Blakemore@enron.com

04/08/2002 11:40 AM

To: Robert Thresher/DENVER/NRELEX@NRELExchange
cc: peter.goldman@ee.doe.gov@SMTP@NRELExchange, Brian Smith/DENVER/NRELEX@NRELExchange, Stanley Calvert/EE/DOE@DOE
Subject: RE: Biographical Information

Good morning Bob,
Thank you for summarizing the agenda we discussed. I will pass it along to the rest of our team. We are delighted to have the opportunity to attend this meeting and anticipate the discussions will be valuable to all involved.
RWB

"Thresher, Robert" <Robert_Thresher@nrel.gov> on 04/07/2002 01:07:22 PM

To: '"Ralph.Blakemore@enron.com"' <Ralph.Blakemore@enron.com>
cc: peter.goldman@ee.doe.gov, "Smith, Brian" <Brian_Smith@nrel.gov>, "Calvert, Stanley" <scalvert@tcplink.nrel.gov>

Subject: RE: Biographical Information

Ralph, Thanks for the information on the attendees for the meeting. As I remember you and I talked briefly about a simple agenda along the lines of the following:

1. The GE Vision and Strategy for Wind Energy
   - Overview of the Vision and Business Plan
2. Current GE-Wind Development Plans
   - Past Development Partnerships
   - New Turbine development priorities, schedule and needs
3. DOE Wind Program Vision and Strategy
4. Discussion by all of how to continue the successful partnership

The meeting is currently scheduled to start at 1:30 PM and last about 1.5 to
2 hours, on Wednesday, 10 April 2002. If you or your management would like to revise the agenda, please feel free to do so. I don't expect the meeting
to be very formal, so we can revise the agenda as needed on the spot.

I am greatly looking forward to hearing about your plans for the future.

Bob

-----Original Message-----
From: Ralph.Blakemore@enron.com [mailto:Ralph.Blakemore@enron.com]
Sent: Friday, April 05, 2002 6:49 PM
To: robert_thresher@nrel.gov
Cc: peter.goldman@ee.doe.gov

6

Subject: Biographical Information

Bob,

Provided are bios for Jon Ebacher, Craig Christenson and myself. Jim Lyons (prominent in GE's corporate R&D), Allan Sides (prominent in GE's acquisition of EWC), Peter Duprey (GE business development) and Rob Wallace (no information at this time) will also attend the meeting. I hope to have biographical information for these gentlemen on Monday. I will forward the remaining bios as soon as I receive information. Thank you for your guidance and support in preparing for this very important meeting.

Ralph Blakemore
Director, Advanced Technology-Enron Wind Energy Systems
Director, Global Intellectual Property-Enron Wind Corp.
(661) 823-6872, Tehachapi
(213) 452-5102, Los Angeles

(See attached file: Ebacher bio_2001.doc)(See attached file: Christenson bio_2001.doc)(See attached file: Blakemore bio_2001.doc)

****
This e-mail is the property of Enron Corp. and/or its relevant affiliate and
may contain confidential and privileged material for the sole use of the intended recipient (s). Any review, use, distribution or disclosure by others is strictly prohibited. If you are not the intended recipient (or authorized to receive for the recipient), please contact the sender or reply
to Enron Corp. at enron.messaging.administration@enron.com and delete all copies of the message. This e-mail (and any attachments hereto) are not intended to be an offer (or an acceptance) and do not create or evidence a binding and enforceable contract between Enron Corp. (or any of its affiliates) and the intended recipient or any other party, and may not be relied on by anyone as the basis of a contract by estoppel or otherwise. Thank you.
****

Enron Wind
13000 Jameson Road
Tehachapi, CA 93561
Tel. (661) 823-6700
Fax (661) 822-7880
www.wind.enron.com

December 3, 2001

Dear Mr. Goldman:

In light of the recent headlines concerning Enron Corp., I am writing to update you on the current status of Enron Wind Corp. and our subsidiaries. We are clearly disappointed with the recent events surrounding Enron Corp. I want to assure you, however, that we are confident that these events will not significantly hurt our business or adversely affect our ability to satisfy our obligations to you. Here are some facts of which you should be aware:

1. *Enron Corp's Bankruptcy Filing Does Not Include Enron Wind Corp and its Subsidiaries.* Enron Wind and its subsidiary companies, including Enron Wind GmbH, are **not included** in Enron Corp.'s bankruptcy filing. Enron Wind does not intend to separately seek protection under U.S., German or any other bankruptcy laws. Rather, Enron Wind and its subsidiary companies will continue to operate their businesses in the ordinary course.
2. *Enron Wind is Independent.* As you may know, while Enron Wind is a subsidiary of Enron Corp., we operate our business separate and independent from Enron Corp. Enron Wind and its subsidiaries are all independent legal entities.
3. *Enron Wind is Financially Strong.* 2001 is proving to be a very profitable year for Enron Wind. We have a strong balance sheet. With strong wind power projections for 2002 and with our widely respected technology, we anticipate that 2002 will be an equally strong year. Most importantly, and notwithstanding any rumors you may have heard to the contrary, we have the ability to meet, and intend to meet, all of our business obligations.

We anticipate no changes to our manufacturing and turbine installation schedules for the remainder of this year. Our global operations remain on track to complete all of our planned business for the year and we look forward to a robust 2002. My message to you is that, notwithstanding Enron Corp.'s bankruptcy filing, we are doing everything possible to maintain "business as usual" at Enron Wind.

I hope this letter addresses any concerns you may have and I look forward to our continued and mutually beneficial business relationship. I also appreciate your support and patience as we all work through the issues surrounding Enron Corp.

Of course, we will keep you informed of any new developments. In the meantime, if you have questions or concerns, please call me, Herbert Peels (our General Manager for European Operations – 49-5971-980-1001) or Bob Gates (our Americas Senior Vice President – 661-823-6730).

Very truly yours,

Adam S. Umanoff
President and CEO

7.

Zond
A Subsidiary of Enron Wind Corp.

Zond Energy Systems, Inc.
13681 Chantico Road
PO Box 1970
Tehachapi, CA 93561
(805) 823-6423
Fax (805) 823-1829

November 18, 1998

Mr. Stanley Calvert
Manager Turbine Research Program
Department of Energy Wind Energy Program
1000 Independence Avenue, SW, EE-11
Washington, D.C. 20585

Dear Mr. Calvert:

Enclosed please find a revised "Project Cost Plan" dated November, 1998, for the "Next Generation Turbine Development Project Definitized Subcontract ZAM-7-13320-26" which now includes the NREL Cost Share, as well as the ZES Cost Share. Also attached is an updated "Revision Record" which reflects this addition. Please update your binder accordingly.

Should you have any questions please do not hesitate to contact Ralph Blakemore at (805) 823-6872 or myself at (805) 823-6476.

Sincerely,

Susan Jackson

Susan Jackson
NGT/NTRT

Enclosures

8

Zond
A Subsidiary of Enron Wind Corp.

Zond Energy Systems, Inc.
13681 Chantico Road
PO Box 1970
Tehachapi, CA 93561
(805) 823-6423
Fax (805) 823-1829

October 27, 1998

Mr. Stanley Calvert
Manager Turbine Research Program
Department of Energy Wind Energy Program
1000 Independence Avenue, SW, EE-11
Washington, D.C. 20585

Dear Mr. Calvert:

Enclosed is 3.2 thru 3.3.1 of the Next Generation Turbine Development **Project Work Plan** (Deliverable #2, Definitized Subcontract ZAM-7-13320-26) this was inadvertently left out.

Sorry for the inconvenience this may have caused.

Sincerely,

Susan J Jackson

Susan Jackson
NGT, NTRT

Enclosure

9

File

* Chris Morris
- FOIA office
MA-53

- Audrey Newman
EE-10

Department of Energy
Washington, DC 20585

June 1, 1999

Charles D. Case, Esq.
Hunton & Williams
1900 K Street, NW
P.O. Box 19230
Washington, DC 20036

FOIA #9904300003

Dear Mr. Case:

The copies and electronic correspondence responding to your April 26, 1999, request under the Freedom of Information Act for documents relating to ENRON, global climate change, and emissions trading, submitted to my office from 1997 to the present by John Palmisano, are enclosed.

Please note that this response is solely for the Office of Power Technologies.

Sincerely,

Daniel M. Adamson
Deputy Assistant Secretary
Office of Power Technologies
Energy Efficiency and Renewable Energy

Enclosures

10

Printed with soy ink on recycled paper

DOE F 1325.8
(8-89)
United States Government Department of Energy

memorandum

DATE: May 12, 1999

REPLY TO ATTN OF: Chris Bordeaux, USIJI, 202-586-3070

SUBJECT: ENRON John Palmisano papers

TO: Audrey Newman

Please find the attached two documents provided to me by Mr. John Palmisano.

Attachments (2)

11

Dear Colleague:

FROM: **John Palmisano, Enron International**

DATE: **January 8, 1999**

SUBJECT: **Two Papers Regarding Early Credits for Greenhouse Gases**

Attached is a short paper discussing the environmental and economic benefits that might derive from early crediting – benefits that I cannot detect in some proposals. I have asked many people if there is any evidence that early crediting provides net economic benefit or new environmental benefits and I have not been able to find any substantiation of these benefits; therefore, I thought I would look into the matter.

While I support early crediting, like many broad-brush concepts, early crediting means little if there are no details. It is difficult to actively support a policy that must be fine-tuned to be analyzed. It is at that point, when there is legislative/regulatory flesh on high-level-rhetoric bones, that we can assess the economic, environmental, political, and equity benefits that determine if early-crediting is merely an instrument for wealth transfer, promoting innovation, "jump-starting" emissions trading, or will be an illusion.

Also, you might want to read a recent US Government Accounting Office paper on early crediting. The GAO publication (GAO/RCED-99-23) speaks to many of the concerns that I have shared with colleagues and reinforces my conviction that advocates for early crediting (among whom I am one) have an obligation to demonstrate the benefits, costs, and implementation path that makes early credit viable. You can find the GAO paper on the Web on the GAO web-site:

www.gao.gov/new.items/rc99023.pdf

I will be writing other papers on this subject, especially the economics of early crediting, to better understanding as to how early crediting can be shaped to achieve well-defined and measurable objectives.

If anyone has done a study or knows of a study that documents the environmental and economic benefits that derive form early crediting, could you please pass it my way. Any comments you have on the paper would be appreciated.

Attachment: Word-file
Excel file (containing an example)

01/26/99

What Are The Economic and Environmental Benefits From Early "Crediting"?

By
John Palmisano
Enron International
Washington, DC

Creating incentives for reducing greenhouse gases can produce many economic and environmental benefits and, as a general concept, should be supported. One kind of incentive for early action is early crediting. It has been asserted that early crediting can produce economic and environmental benefits. This may be true, but it has not been demonstrated. How does early crediting work and what are the benefits?

What Does Early Crediting Mean?

"Crediting" can have at least two meanings: (1) granting recognition, and (2) granting an asset which potentially can offset a liability.

The use of "crediting" to imply recognition is a limited, and easily agreed upon action. "Good deeds should receive credit" is another way of saying "good deeds should be recognized." The question is "what constitutes proper recognition?" Is proper recognition an accolade, public praise, a tax credit that offsets a tax liability, preferential treatment for air pollution permitting, preferential treatment for financial grants, or money?

Crediting that implies giving an emission credit that can be used to offset a future emissions control obligation is a much more ambitious and complicated action.

The limited form of crediting (recognition) is easily agreed to; the more broad form of entitlement is much more difficult to craft.

What Actions Produce Environmental and Economic Benefits?

Extra environmental benefits occur when companies reduce emissions before regulations take place. These environmental benefits occur because companies do not install pollution control technologies coincidentally with the exact start date of regulatory programs. For example, there is a small incremental environmental benefit when a company installs an air toxic control device a week, a month, or a year before the effective date of an air toxics regulatory control program. The only cost is the time value of the money that could have been put to a more productive economic use. Therefore, for normal regulatory programs, early action results in a small economic cost and a small environmental benefit.

13

While the costs and benefits derived from some early actions might be small, if poorly designed, a regulatory program can penalize early action. For example, it is possible to imagine a company that has been a good environmental actor but because of its current low emissions it gets a lower emissions baseline than companies that have done less. The company's good environmental citizenry now exposes it to more stringent reduction targets, which translates into higher costs.

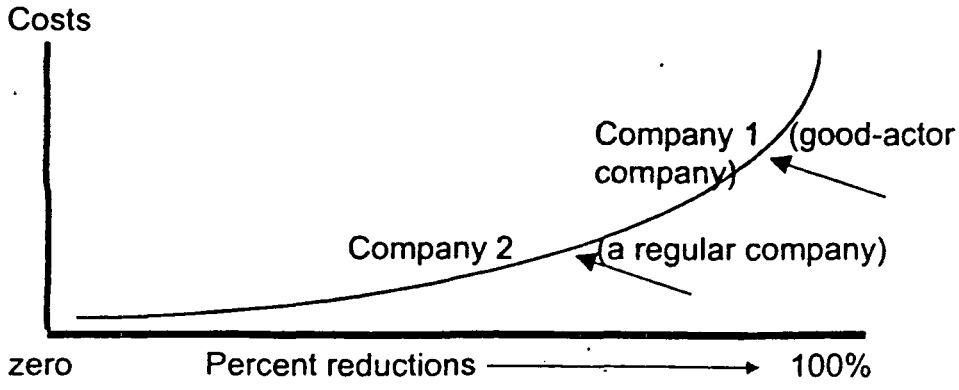
Table 1 and Illustration 1 provide an example of this problem. In general, the more pollution is reduced the more it costs. The marginal cost to control each additional unit of pollution increases disproportionately as the percent of emissions controlled increases. In Table 1, Company 1 has already reduced much of its emissions. This company is referred to as a good-actor company and it faces very high control costs, while its competitor, relatively less clean Company 2, faces lower control costs.

Table 1
Good Deeds Can Sometimes Be Punished

	Current emissions	Future target @ 50% reduction based on current emissions	Incremental cost to reduce more emissions
Company 1 (a good-actor company)	10 pounds per million cubic feet of product input	5 pound per million cubic feet of product input	Very high
Company 2 (a regular company)	30 pounds per million cubic feet of product input	15 pounds per million cubic feet of product input	Modest

Illustration 1 below reveals the relationship between the percent of emissions removed and increased emissions control costs. If, as is described in Table 1, the good-actor company is required to reduce the same percent as is the regular company, then the good-actor will face much higher control costs. If they are competitors, the good-actor may be at a distinct disadvantage.

Illustration 1



A potential remedy to the same-percent-reduction problem can be constructed by requiring all companies to use a previous-year emissions baseline and then creating an emissions cap. The emissions baseline would be chosen from a time before Company 1 installed emissions control technology. We could take the throughput multiplied by the emissions rate and create a historic baseline that will be the companies' emissions cap. The new regulatory program might lower overall allowable "capped" emissions. Depending on the allocation methods, the good environmental actor, Company 1, may already be in compliance with its new emissions cap. The other company, however, may be required to create extra emissions reductions. Thus, the good actor receives credit for previous actions.

How might rewarding early action work in the context of greenhouse gas controls? Assume companies want to start controlling greenhouse gas emissions to prepare for a future (but unspecified) regulatory regime. Bipartisan political and environmental interests could send a powerful signal that qualified, quantified, real, and verified emission reductions from a historic baseline will be recognized and will put companies on a downward emissions path toward future control requirements. Such a signal articulates a fundamental principle: to the extent possible, doing good deeds should not disadvantage companies. This signal, however, does not also require the granting of offset-capable emission reduction credits.

Acting early will put companies on a less steep emissions control path in the future. This second type of early action has been shown to be useful in the case of SOx allowance trading under the United States' Clean Air Act. How might a domestic early action program work for the prudent control of greenhouse gas emissions?

A Questionable Type of Early Action

There is another type of early action. This system could potentially involve double crediting as an extra incentive for early action.

Imagine an early action program that produces a lowered emissions baseline, as described above, and also yields emission reduction credits that can be used to offset future emissions. Does such a program make environmental sense?

The answer is embedded in how emissions trading works under US EPA guidelines for criteria (or local) air pollutants. Under the US EPA's Emissions Trading Policy Statement, emission reductions can only be used to offset an emission control liability if the reductions are surplus and do not involve double counting. Reductions must be contemporaneous with emission increases, not time-lagged.

Consider several people smoking cigarettes in a closed room and a regulatory program to limit cigarette smoking is created. Under some emissions trading rules, there could

be a cap on the number of cigarettes smoked equal to a certain number per hour. Say person A was limited to two cigarettes per hour and person B was limited to one per hour. Person B is free to buy a cigarette smoking right from person A. Transactions could take place so long as total cigarettes consumed were equal to or less than three cigarettes per hour. This is how the emissions allowance trading system works.

Now consider the situation when person B wants to smoke two cigarettes in an hour. This time, however, he does not buy an allocation from person A but instead smokes a second cigarette stating that he is using an offsetting "credit." This "credit" is being claimed because B did not smoke in the room **before** the regulatory program took effect. Person B wants an early "credit" for a previous good deed. Should previous acts, albeit good deeds, be rewarded by creating illusionary "credits" that can offset future pollution? Would it make good regulatory sense to reward reduced, pre-regulatory, smoking with "credits"? Would this approach make environmental sense for controls on air toxics, such as mercury emissions, from power plants where no regulations now exist but future controls might be imposed? What are the implications of such a practice?

Note that the illusionary credit problem exists whether or not we are discussing an allowance-based system or an emission credit-based system. Under a credit-based system, reductions can only be used if they are real, quantifiable, verifiable, surplus, and contemporaneous. The illusionary credit fails this test. It is instructive to read from draft EPA guidance on early reductions for non-attainment problems (Office of Air and Radiation, Office of Policy Analysis and Review, draft of Early Reductions Paper, March 30, 1998):

> ...programs to foster early reductions, such as a trading program with banking, may ultimately lead to increases in emissions beyond the attainment date and therefore delay attainment. (page 1, para. 2)
>
> Early reductions are measured against a baseline of mandated reductions. At any given point in time, the baseline represents the expected levels of reductions as established by the combination of requirements for programs...and reasonable further progress and attainment scheduled to be in effect. The rules establishing the baseline are obviously important, and EPA should provide formal guidance to ensure uniformity of treatment of early reductions across States. (page 1, para.3)
>
> Unfortunately, banking can create planning concerns and might also result in future air quality problems if sources use many banked emissions... (page 2, para. 4)

Note that in the above example, Person B claimed a credit based on his own "baseline" and believes he has earned "credits." What are the consequences of this version of early crediting -- every early "credit" either forces the smoke-filled-room to be out of compliance with the regulatory program or requires some other person to control more than their fair share. There may be over-riding public policy objectives that warrant rewarding some parties at the expense of others, but policy objectives should be well specified in advance and understood by all.

Table 2 (page 8) is an arithmetic illustration of what can be referred to as illusionary crediting in the context of greenhouse gas controls. In Table 2 there are two examples of companies reducing emissions. In Example 1, the two companies (1 and 2) merely reduce and meet their budget targets (as summed-up over the five year period); no crediting for early reductions is granted other than recognizing the emission reductions and lowering the amount of subsequent reductions required to meet budget requirements. In Example 2, companies 1 and 2 are given early "credits" for reductions they achieved to get down to reasonable emission levels before the budget period starts. By giving early credits to Company 1 and 2, other companies will be required to control more. Since companies 1 and 2 use or trade their emission credits to offset a future emission liability, there is no, or very little, incremental environmental benefit. Since other companies must do more to control emissions, there is no net economic benefit.

Notice that in Example 2 in Table 2, early credits accumulate every year before the first budget period begins. Therefore, some credit-giving rules can transfer substantial wealth to so-called early actors while imposing substantial penalties upon those companies that are neither good nor bad but merely choose, for whatever reasons, to wait to control emissions until a regulatory control program goes into effect.

Thus, double-counting for credits – a lower recognized baseline and inter-temporal credit-giving – may or may not produce the desired environmental results while surely distributing rewards to one group and penalizing others. Clearly, there will be credit-winners and credit-losers, and with double counting, as more companies participate, more and more pain will be imposed on fewer and fewer non-participating companies. In the extreme case, if all companies participate, the entire system falls apart since there is no entity from which the extra-reductions can be secured.

Considering the Economics

Consider the examples presented in Table 2. Example 2 describes a case in which companies get credit for taking actions they must take to meet their emissions control targets. The credits are given to encourage greenhouse gas controls and create institutional experience with certifying emission credits. Let's consider the economics of such an action.

Illustration 2
Companies 1 and 2 from Table 1 Get "Anyway" Credits

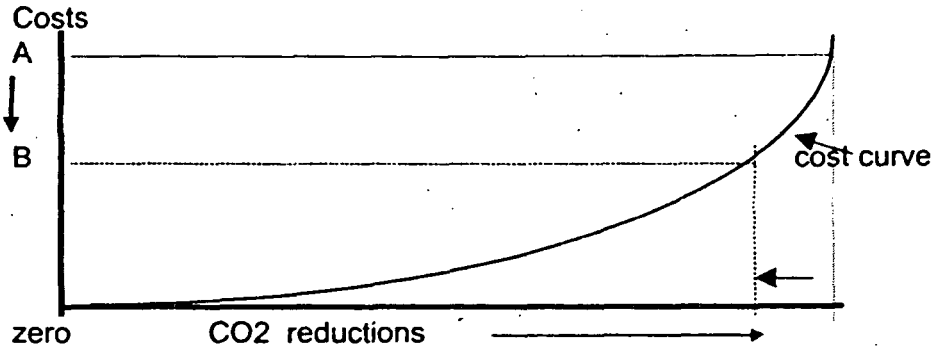


Illustration 3
Effects of "Early Crediting" on Others

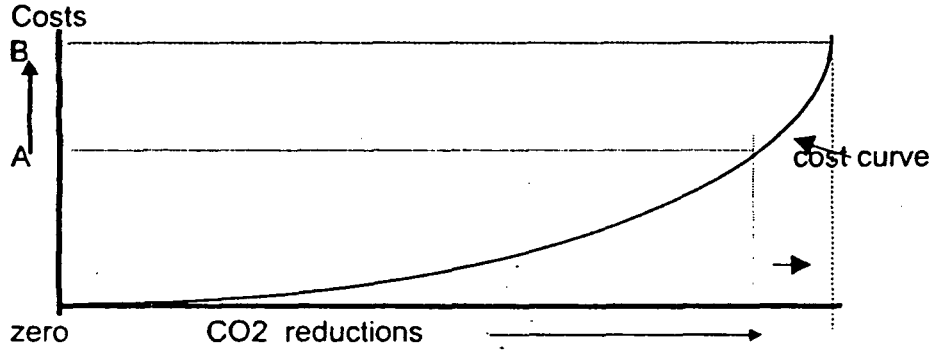


Illustration 4
Effects of "Early Crediting" on Others With Different Curves Reflecting the Cost of Control

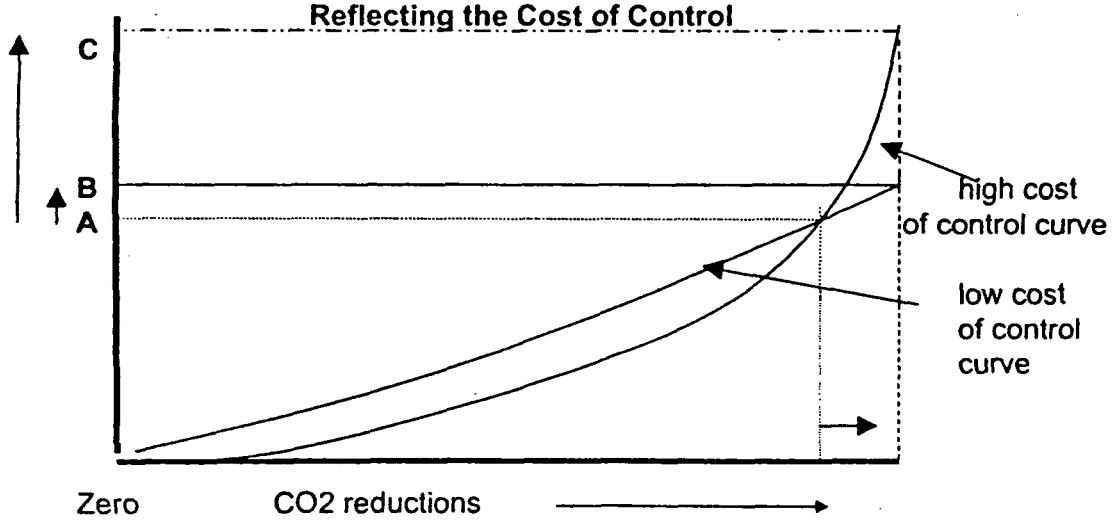


Illustration 2 presents the effects on the cost of control for companies 1 and 2. If these companies can bank emission reductions that would have happened anyway, then

other companies, depicted by Illustration 3, must over-control emissions more than their fair share. For such a transaction to be economically efficient, the cost savings to companies 1 and 2 must be greater than the cost imposed on other companies. Or, in terms of our illustrations, the cost saving represented by AB in Illustration 2 must be greater than the negative cost effects, AB, in Illustration 3.

Illustration 4 shows that "other" companies could have imposed upon them more costly control requirements (line AC) or less costly control requirements (line AB) than the relief offered receivers of early credits (line AB in Illustration 2).

It is not clear that society benefits under all "early credit" proposals. The result depends on the slopes of the curves, the amount of the allocation given to early credit recipients, and other factors beyond the scope of this paper. Transferring costs from one company to another may yield no net economic improvement and there is no a priori reason to expect net economic benefits.

Retrospective, General-Prospective, and Specific-Prospective Early Credit Programs

There are three types of credit-giving programs. One program deals with giving credits for actions that have previously occurred. Another type of program could be future looking and include all types of emission-reducing activities (a general-prospective model.) The third type could be prospective and limited to only specific emission-reducing activities that most stakeholders agree should be encouraged, today.

Previous reductions:

Granting offset-capable reductions for previous reductions might be politically or technically difficult, but not impossible. The environmental benefits have not been demonstrated.

General-prospective reductions:

For reasons described above, prospective reductions that result from all actions might be a difficult program to design and implement. In this case also, the environmental benefits have not been demonstrated.

Crediting reductions from specific-prospective actions:

Early credits from a limited class of future reductions might be the easiest program to design and implement. Offering an early credit program is beyond the scope of this paper; however, one can conjecture that a program that is more easily designed and agreed upon would be characterized by a few policy goals. Such a program would:

(1) Promote innovative clean energy technologies,
(2) Promote exports,
(3) Promote good energy outcomes,

(4) Promote multiple environmental objectives,
(5) Promote participation in the Kyoto process by countries and companies that heretofore have had modest involvement, and
(6) Be consistent with the Kyoto Protocol, as it now stands.

All "Crediting" Ideas Are Not The Same

Rewarding early action can take many forms. It can mean not penalizing good deed doing. It can mean establishing fair emission baselines. It can mean creating systems that reward some companies for what they must do anyway while compensating for this transfer by over-controlling the emissions of others. It can mean creating extra actions to reduce emissions and stimulate clean energy technologies. It can also mean jump-starting the market for international flexibility mechanisms (joint implementation or clean development mechanism transactions). The goals of an early crediting program must be clear and measures for success defined.

This paper concludes with the well-known bromide: "The devil is in the details." Early crediting programs might provide many good environmental and economic results, but the economic and environmental outcomes from each version of early crediting should be carefully analyzed and considered before rushing to accept or reject a particular early credit concept. The author supports early action and early crediting and also supports economic, environmental, and evaluation rigor in establishing such programs.

This paper is intended to provoke comments on the need for analysis with respect to early crediting. The paper did not consider a model where there is international credit or assigned amount trading. The paper did not offer an economic analysis. That will be the subject of a forthcoming paper.

Any comments would be appreciated and should be sent to the author.

John Palmisano
Enron International
1775 Eye Street, N.W. Suite 800
Washington DC 20006
Telephone: 202-466-9159
Fax: 202-331-4717
E-mail: jpalmisa@ei.enron.com

Table 2
Early Credit Examples

									<---- budget period					total emissions for budget period
Year	2000	1	2	3	4	5	6	7	8	9	10	11	12	
Example 1: No early action program: emissions in box are estimates for yearly emissions														
Company	emissions	tons/year							emissions in tons/year					
1	17	16	15	14	13	12	11	10	9	8	7	6	5	35
2	23	22	23	21	19	18	17	14	12	11	10	9	8	50
all others	85								50	45	40	35	30	200
all companies	125								71	64	57	50	43	**285**

Example 2: Early "crediting"

Company 1 and 2 are given credit for reductions they made (2000-2007) below year 2000 levels. Notice Company 1 and 2 will emit more in year 2008 and other years because they "banked" their early credits for use in the budget period (2000-2012).

Company														
1	17	16	15	14	13	12	11	10	9	8	7	6	5	35
2	23	22	23	21	19	18	17	14	12	11	10	9	8	50
credits for 1	0	1	2	3	4	5	6	7	5	5	6	6	6	28
credits for 2	0	1	0	2	4	5	6	9	5	5	5	6	6	27
Extra reductions	from other companies to compensate for early credits								-10	-10	-11	-12	-12	-55
other companies	85								50	45	40	35	30	200
all companies	125								71	64	57	50	43	**285**

The amount of "credits" derives from reductions made in a year against the baseline year. Therefore, Company 1 gets 3 tons of credits in year 2003 from a 2000 baseline (17-14).

Extra reductions are required by other sources to cover the 55 tons of early "credits" given to Company 1 and 2 since regulators must meet the budget target of 285.

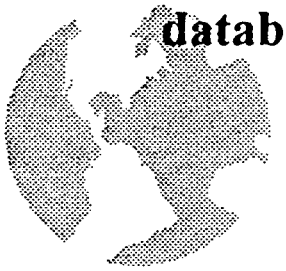
A Program to Reward Early GHG Reductions

Center for Clean Air Policy
February 17, 1998

Presented to:
Clean Air Act Advisory Committee's
Subcommittee on Energy, Clean Air and Climate Change

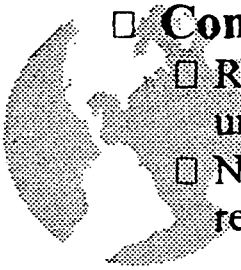
Outline

- Pros/cons of credit for early reductions
- Basic elements of system
- Integration into international system
- How to handle credits registered in 1605(b) database



Why Credit for Early Reductions?

- **Pros**
  - Design smooth transition towards 2008 target
  - Reward emitters for taking early action
  - Build capacity and knowledge of future participants in trading system
- **Cons**
  - Run risk of diluting allowance system through unforeseen loopholes
  - Non participants could face politically untenable reduction targets in 2008

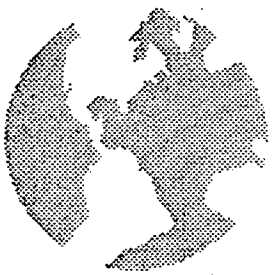


Basic Elements of System

- **1998-2007**
- **Voluntary**
- **Participation**
  - All emitters of GHGs can participate
    - Upstream & downstream emissions
  - Cannot leave system early
    - Once commit to system, must remain for duration
- **Credits**
  - Total allowances distributed in 2008 - 2012are reduced by amount of reductions achieved pre-2008

Key Criteria

- Credibility of reductions
- Integration into international system
- Administrative ease



Groundrules for Baselines

- **Baselines and reductions determined on a companywide basis not facility by facility**
- **Normalize for ownership**
  - shutdown
  - facility sell off
  - replacements

Annual Target Level

- **Straight line from actual emission levels in 1998 to 2008 cap**

Credit Accrual and Use

- **Credits will be given only for actual reductions below predetermined baseline**
- **Regulated entities could purchase early reduction credits to meet binding target**
  - i.e. if formal trading system in 2008 is upstream, then early reductions from downstream emitters could be purchased and used by upstream producers

Alternative Methodologies

- **Generation Performance Standard (GPS) for electric utilities**
  - straight line between performance rate in 1997 to expected level in 2008
- **GPS could also be used for new sources**

Integrating Section 1605 (b) GHG Credits

- **Options**
  - All or none
  - Case by case review
  - Count long form only
  - Count only credits that are below stabilization
  - Apply discount factors
- **Credits accepted are annualized and added to 1998 baseline. Or 1% of allowances set aside and issued by formula on discounted basis.**

Integration into Binding System

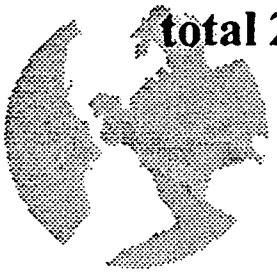
- **Effect on Binding Target**
  - pool of allowances allocated in 2008 - 2012 to comply with binding target will be reduced by 5% to cover early credits
    - 1% of allowances dedicated to 1605 (b) credits
    - 4% dedicated to post-1998 early reductions
- **Relation to Clean Development Mechanism**
  - CDM credits are "additional" -- added to company's 2008 - 2012 allowance allocation

Niagara Mohawk Proposal for Giving Credit to 1605 (b) Filers

1. **100% for projects where entity-wide reports of reductions are below 1990 minus 7% level**
2. **20% credit for project-only reports**
3. **Entity-wide and project reports above 7% threshold receive 100% for projects minus % above the 7% threshold (min. credit = 30%)**

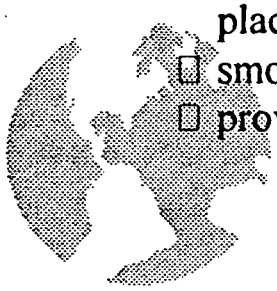
Niagara Mohawk Proposal, cont.

4. **Bonus for filers under 3) above if emissions per unit of output decrease in period.**
5. **Prorate all of the above once basic credit allocation is complete so as not to exceed 1% of total 2008 - 2012 allowances.**



Conclusion

- **Credit for early reductions is a useful tool**
  - achieves actual reductions before mandate
  - educates participants
  - provides momentum to ensure a solid program is in place prior to 2008
  - smoothes transition, so reduces "shock" in 2008
  - provides testing ground for full-fledged system



Air Permit Trading Paradigms for Greenhouse Gases: Why Allowances Won't Work and Credits Will

Send comments to John Palmisano
Director, Regulatory Affairs
Enron Europe Limited
London
Fax: 44-171-316-5391
Telephone: 44-171-316-6733

15.

AIR PERMIT TRADING PARADIGMS FOR GREENHOUSE GASES: WHY ALLOWANCES WON'T WORK AND CREDITS WILL

BY
JOHN PALMISANO

There has recently been increased interest in the use of market-based systems for air pollution control. That interest has most recently expanded to the climate change arena with the proposed system being the international trade of carbon or greenhouse gas (GHG) reductions. At the same time, the air trading debate is hampered by great confusion over concepts, terms and the results from past programs in the United States which are the basis for supporting an international air trading program. This paper demonstrates that, if done correctly, air trading can be a useful approach to control of GHG and if done poorly, air trading can impede progress toward getting real reductions.

Twenty years of success provide substantial evidence that an air trading program based on credits can move a GHG program forward more quickly and at a lower cost than a command and control program. Such a system would gradually introduce new regulatory structures, accommodate changes in many national energy and environmental regulatory programs and provide the basis for even more cost-effective policies. Meanwhile cost-effective carbon reductions could be made available and real reductions could be achieved in a relatively short time period.

In contrast, a program based on carbon allowances, sometimes called cap-and-trade, is most likely to become an anchor that will restrain the implementation of a GHG mitigation program -- restrained by the time-consuming requirement to develop the entire regulatory infra-structure to support the allowance system before any trades take place.

The choice for regulators and other pro-active stakeholders is simple, do they want the real-world economic benefits that derive from a credit trading system or do they want the theoretically better benefits that come from an allowance system. Is society better off with a high likelihood of something very good or a low likelihood of something only slightly better?

CREDITS AND ALLOWANCES

There are two basic types of air permit trading -- credit systems and allowance systems. Both are known by many names. Table 1 lists some of the alternative names for credits and allowances and the programs in which they are used.

The most common names for credit-based systems are ERCs, "offsets" and "bubbles."

ERCs — An emission reduction credit, or ERC, is an emission reduction which meets certain criteria established by regulators. ERCs must be "real", "surplus", "quantifiable" and "enforceable". An ERC is the common currency of emission credit trading.

Offsetting — Offsetting is the meeting of a pollution control obligation by getting the equivalent reduction elsewhere. In the US, in cities or counties that fail to meet ambient air quality standards, firms constructing major emission sources or major modifications must offset their expected emissions increase

by obtaining emission reductions of the same pollutant from other companies. (See Figure 1 for an example of offsetting in the United States.)

Bubbles — Bubbling provides similar flexibility to existing sources that offsetting provides to new and expanding sources. Using a bubble, a plant manager can make emissions control decisions on a facility-wide basis (as if an imaginary bubble existed over the facility) rather than on a source-by-source basis. Cheap emission reductions can be used to offset expensive emission reductions. (See Figure 1 for an example.)

TABLE 1
NAMES AND EXAMPLES OF CREDIT AND ALLOWANCE PROGRAMS

Credits	Allowances
offset	SO_2 allowance
bubble	marketable permit
netting	RECLAIM
emission reduction credit (ERC)	Illinois VOC Program
joint implementation (JI)	OTR NO_x Budget Program

Both credits and allowances are means of achieving emission reduction goals more efficiently and cost-effectively than with a command and control regulatory system. These good results are achieved by letting market forces determine the best compliance strategy for each source. Both concepts allow sources with low compliance costs to over-comply and sell reductions to sources with higher costs. Both trading mechanisms must be driven by some regulatory requirement for emission reductions, but the requirement and the mechanism are independent. For example, either credits or allowances can be used to implement an emissions cap. Beyond these basic similarities, however, there are some important differences between the two modes of trading that have important implications for their effectiveness in solving air pollution problems. Some of the fundamental differences are related to how the program resolves the following issues:

Baseline- the pre-existing emission level against which creditable emission reductions are measured.

Quantification-the accurate measurement of emissions before and during the creation of reductions; hence the measurement of the difference between before and after emissions, thus by implication the measurement of emission reduction credits or surplus allowances.

Certification - the methods, protocols and regulations that ensure that the reductions being offered for trade are valid and creditable within the requirements of the regulatory program.

Allocation - the process of initially assigning allowances to participating sources in an allowance trading program.

The importance and implications of these issues can be seen by looking closer at the functioning of each type of program.

ALLOWANCE TRADING SYSTEMS IN THE UNITED STATES

In an allowance program, the regulator gives the emitter a transferable permit to emit a certain amount of pollution. This allocation declines over time either in yearly or in an otherwise phased manner. The emitter must either reduce its emissions so it emits less than or equal to its "allowances" or the emitter must obtain allowances from another source. For example, if two regulated sources were in an allowance trading program, they would be given their initial allocation, a schedule for reducing their annual allocation, and the opportunity to meet further reduction requirements by controlling more at their own site or by obtaining allowances from the other source. At no time, however, would the sum of emissions from the two plants be greater than that established for the time period. Table 2 illustrates how this system might work.

TABLE 2
AN ALLOWANCE TRADING EXAMPLE

	Current Emissions	Allocation Starting in 1998	Allocation Starting in 2000	Allocation Starting in 2015	Allocation Starting in 2020
Factory #1	1000	800	720	400	200
Factory #2	3000	2000	1800	1000	500
Total tons/year	4000	2800	2520	1400	700

In this example, factory 1 must reduce its emissions by 20 per cent to comply with its initial allocation while factory 2 must reduce emissions by 33% to comply with its initial allocation. Each factory must reduce emissions from 1998-2000 by 10 percent. By 2015 each factory must reduce their emissions by 50 per cent. By 2020, emissions must be reduced by 75 per cent from the 1998 baseline.

It is obvious that the initial allocation is an important issue. Factory 1's initial allocation is 80 percent of their current emissions while factory 2 has a relatively lower allocation. The per cent removal usually relates to cost and it is very likely that one company will find reductions to be less expensive than the other. This means that one firm has suddenly been endowed with a valuable asset and that firm might, for compensation, over control and sell some of its allowances to the second firm.

Under an allowance system, all sources in a regulated sector must be in the program, even if they choose not to trade allowances. Once established, the program is straightforward because allowances are issued and pre-certified by the regulator at the beginning of the regulatory program. Under some allowance based systems, if actual emissions are below the allocation limit for a given time period, the emitter can bank the difference for future use. Of course, measurement of actual emissions is very important under the allowance system.

A main problem with the allowance system is that all of the issues of baseline, certification and allocation must be settled for all parties, once and for all, before the program can begin. It is very difficult if not impossible to change the program once it is started. This creates great pressure to make the program "perfect" before it begins. These issues are intellectually difficult because the allowance system suddenly grants existing sources a substantial off-book asset;

hence all emitters must be included in regulatory negotiations, a process which slows down the resolution of many issues.

When many conflicting parties (almost all multi-billion dollar companies with considerable economic and political influence) are involved in the resolution, the result can be a "gridlock" and delays in developing other parts of the regulatory system. The result can be multi-year delays in the implementation of an allowance program or the outright death of the system as happened with the hydrocarbon allowance system for Los Angeles.

Some of the issues which must be addressed include:

- Baseline - the baseline must be resolved for all sources in the program before the program can begin. This means addressing historical emission levels which may not have been measured consistently or at all, allowing for non-standard operations during the operation period, units which have come on line since the baseline period and other questions. This issue is very complicated even when addressing one kind of measure from one type of source, such as emission reductions from electric utilities. It becomes much more complicated if an attempt is made to address different end use sectors (industrial, mobile source, residential, etc.) or different kinds of measures (efficiency improvement, repowering, pollution prevention). Because all issues must be resolved to the satisfaction of all participants (all sources must participate) before the program can begin, the geometrically increasing complexity of expanding the program makes it that much more difficult to get the program going.
- Quantification - accurate and appropriate measurement of emissions and reductions is critical to the operation of any trading program. At the same time, measurement requirements which are too costly or complicated will discourage participation in trading. Experience in the United States' SO_2 trading program has shown measurement to be one of the most contentious issues because it imposes large costs on all sources whether or not they ever choose to trade. It also has been one of the largest barriers to expansion of the program through opt-ins or extensions. Again, extending trading to broader sectors exacerbates the problem since each sector has its own problems and methodologies. Bringing in different countries under a carbon trading program adds an entirely different dimension of conflict in units, protocols and historical procedures for emissions measurement. In an allowance program, all of these issues must be resolved before the first trade can take place.
- Certification - the one advantage of an allowance program is that once the allowances are created, they are permanently certified and can be traded without further regulation. The problem is that it is very difficult procedurally and practically to change the quantity of allowances after they have been created. New information on the validity of the allowances, the accuracy of measurement or certification of allowances in the system is difficult to incorporate after creation of the system. This knowledge is another factor that leads the creators of the allowance system to take additional time to make it "perfect".
- Allocation - perhaps the key step in an allowance system is the initial allocation of allowances to the sources. The allocation determines not only who starts out with the "chips" in the allowance trading game but also determines who has low

marginal-cost reductions available to sell. It is a granting of economic value by the regulators that has enormous economic and trade implications. There are a number of basic allocation strategies and an infinite number of variations -- equity, costs, number of years in the regulatory system, or employment impacts. There can be endless discussions on allocation even within one sector and adding additional sectors lengthens the discussion (note that there is no multiple-sector allowance trading program in the United States while there are multi-sector credit based systems). Again, one reason this step is so crucial and time-consuming is because it only happens once.

ALLOWANCE-BASED SYSTEMS IN EUROPE

Allowance trading systems have not been implemented for any air pollutant within or across European countries. Only a few countries have created the opportunity for credit-based systems. Despite the support for these types of systems from economists and policy analysts there has been no large introduction of these systems in Europe for air pollution control.

A recent initiative flowed from the work done by Dr. Ger Klaassen. Dr. Klaassen cites over 200 references in Trading Sulfur Emission Reduction Commitments in Europe: A Theoretical and Empirical Analysis (1995, The International Institute for Applied Systems Analysis). At least one-half are European authors and European organizations. Yet despite outstanding scholarship, support from the academic and public policy communities and support from some countries, the sulfur trading regime that he analyzed failed to be adopted.

The same is true for NOx and hydrocarbon trading -- great ideas, no implementation.

Without going into the reasons and recognizing that there have been a few credit-based trades in Europe, hand-crafted under special circumstances, it is fair to say that implementation air credit trading in Europe has been difficult and the implementation of allowance-based system has been impossible.

Reaching international agreements is even more difficult than reaching national agreements. Reaching international agreements across different systems of property rights, heterogeneity in the quality of environmental programs, and on economic issues is even more difficult when one leaves the relatively common culture and set of regulatory regimes in the European Union and includes the transitional economies, Arab states, and a host of developing countries.

The absence of any large national allowance trading or credit trading program leaves no base for developing the allowance trading program, as was the case in the United States. Specifically, before the United State's sulfur trading program was developed in 1990, there already were thousands of air credit trades and many states had developed air credit trading programs to meet local air quality problems. Thus a large base of human and institutional capital existed upon which the allowance trading program was built. (See Figure 2.)

CREDIT-BASED TRADING SYSTEMS IN THE UNITED STATES

Whereas allowances are created by regulators, in a credit program a source creates a tradable unit by reducing emissions below a regulatory limit. The source has the responsibility to document its baseline and to certify the reduction according to standards and protocols issued

and administered by regulators. Once certified, the reduction is available for use by another source or the source might bank its emission reduction for future use or sale. The source has the responsibility for the documentation that would support the quantification and certification by regulators and trades must be approved by regulators. Since both the creation and use of the credits are individual actions taking place within a regulatory framework, regulators have two opportunities to be assured of the sanctity of a transaction.

The regulatory framework that supports an emission reduction credit (ERC) trading system is simple. Such a system need only specify the environmental concepts that must be demonstrated. Historically these have been that reductions be real, permanent, quantifiable, and enforceable. In addition, the use of an ERC must be environmentally beneficial.

Some Advantages of Credit-based Systems

Speed of Implementation

Issues of baseline, quantification and certification must be resolved by designers of the regulatory system, but not for every regulated entity. This is because not every participant wants to trade. In addition, since an emission reduction credit is granted only after regulatory review and approval, changes in environmental or technology circumstances can be reflected in the granting of more or less reductions based on new conditions. Thus the regulatory framework that supports an ERC system can be quickly developed.

Accommodating Change

As noted above, an allowance-based regulatory system cannot accommodate change, thus forcing regulated entities to fight hard to protect their interests and creating implementation delays. The ERC system, on the other hand, has the flexibility to meet regulator's changing conditions. Hence the ERC system is easier to accept by both regulators and environmentalists and is easier to implement.

Incentive to Maintain Standards

In an ERC system, great emphasis is placed on standards of documentation and certification. It is up to the affected parties to show that they are meeting the requirements for the specific source at issue. Only those firms with an incentive to create or use reductions need get involved in the system and they need only address the issues that affect them directly. The thorny issue of allocation is avoided since the traded currency is created when firms create their ERCs, the common currency of air credit trades.

Real Reductions

The regulatory framework that supports a credit-based system ensures that the reductions are real and environmentally beneficial and requires that individual creators of reductions take the burden of certifying the reductions. Therefore, regulators have more confidence in the environmental outcomes since they have two opportunities to review the reductions -- once when the ERC is created and again when it is used.

Mistakes Can Be Detected and Corrected

Regulators should have an increased comfort level in letting the ERC process go forward because they know that there are chances to ensure that only authentic reductions are created, only authentic reductions can be used to offset existing emission control obligations, and there is an audit trail that documents for third parties the integrity of the complete transaction. This means that fewer regulatory decisions need to be made up front, thus ensuring that a regulatory program can be up and running in the least amount of time.

Flexibility Promotes an Incremental Approach

From the regulatory perspective there are several advantages of a credit-based over an allowance-based system. The system is more flexible because it does not try to define everything all at once and once and for all. It sets functional requirements and lets the participants find the appropriate solutions as needed. As science advances, measurement techniques improve, and new reduction measures become available, creators and users of reductions can incorporate them into their protocols and activities.

Incremental in the Breadth of the Program

Even the coverage of various sectors of the economy (power, transportation, agriculture, etc.) can change over time as long as the reductions meet the basic criteria. In fact, the program coverage does not even have to be defined. Any source which can show real certifiable reductions can enter the program at any time. No source is required to participate. This encourages and rewards innovation and provides opportunity to all sources.

This flexibility of the ERC system prevents the regulatory gridlock which plagues the development of allowance programs. Regulators know that the basic environmental requirements will be upheld. They have opportunities to review and modify the operation of the ERC program. Regulators have less to fear that they overlooked some detail or that they gave away something that can never be retrieved. Sources know that they have flexibility to develop their own approaches if they wish but they are not bound to participate in the ERC trading program -- they can comply by make technology or fuel changes inside their own facilities. Therefore, the program can be quickly implemented and creates the foundation upon which a subsequent allowance-based system can be built. Table 3 and Figure 2 illustrate that success with offsets, bubbling, netting, and emission banking created a base of thousands of informed regulators, environmental professionals within companies, and created institutions that could support allowance trading under the RECLAIM and acid deposition control program.

Some advocates for allowance trading base their argument on the alleged high transactions costs associated with certification and trading. History shows otherwise:

> Certification: It has been claimed that putting the burden of certification on the creators of reductions stifles or prevents trading. Table 3 refutes this assertion. There have been thousands of credit trades of this kind under the United States' bubble, netting and offset policies and no indication from traders or participants in transactions that this process has been a burdensome imposition. In addition, placing the cost of certification on the companies involved in the transaction is

consistent with the polluter-pays-principle. Who else should pay for the certification and associated costs of the credit trade other that the beneficiaries? Finally, given the financial magnitude of most potential carbon trades (literally in the millions of dollars), a few thousand dollars to assure the public of the integrity of the trade is insignificant compared to the cost saving.

High Transaction Costs: While there is the claim that there are high transactions costs under an ERC system, there is no evidence from ERC traders or purchasers that transactions costs have impeded a single offset, bubble, or netting transaction. This assertion has never been supported by data.

TABLE 3
A SUMMARY OF EMISSIONS TRADING CONCEPTS AND OUTCOMES
DATA COVERS 1976-1993

Name of Instrument	Estimated Number of Transactions	Estimated Number of External Transactions	Estimated Cost Savings	Environmental Quality Impact
Netting (offsets used in attainment areas)	5,000 - 12,000	none	$25 - 300 million in permitting costs and $500 - 12,000 million in emission control costs	insignificant
Offsets (used in non-attainment areas)	more than 1,800	200	probably in the hundreds of millions of dollars	insignificant
Bubbles (approved by US EPA)	40	2	$300 million	insignificant
Bubbles (approved at the state level)	89	0	$135 million	insignificant
Banking	under 100	under 20	small	insignificant

Source: Foster and Hahn (1994)
Note: The costs savings presented above should be even larger since Foster and Hahn's data was from 1976-1993.

JOINT IMPLEMENTATION

Joint implementation, JI, is the general concept that people refer to when they think of an international carbon trading regime. It was developed so there would be flexibility for countries and companies to meet carbon control requirements and to encourage groups of countries to join together to fulfill their commitments collectively at the lowest global cost. The Framework Convention on Climate Change embraces both the allowance model and the emission credit model of air trading. However, all activities in the pre-pilot phase and the pilot phase of JI have been credit-based. All the analyses of JI projects has been based on the notion of credit giving. In addition, the United States' and other countries' JI-advocacy programs are credit based.

JI experiments have proceeded as credit based precisely because it is easier to implement -- all we need to understand is the company's initial regulatory control obligation, the credit generator's control obligation, and the rules for credit granting. Sector-wide commitments are not required to be resolved for either the buyer or seller of the credit. There would not be a demonstration of the viability of GHG trading if we had to wait for advance resolution of all the issues required for an allowance program. The fact that the first air trading systems in the United States were credit-based is no accident. The system is easier to implement than the allowance-based system. The fact that the first carbon trading systems developed for cross-country transactions were credit based is no accident; credit systems are easier to implement across cultures than are allowance based systems.

While an allowance based system might provide slightly better cost reductions than a credit based system, the question is whether we can afford or will ever have the time to resolve those issues inherent in the design and implementation of an allowance system.

ALLOWANCE BASED SYSTEMS EVOLVE FROM CREDIT BASED SYSTEMS

Credit programs have been established in every U.S. state. Trades can go and have gone forward as soon as the basic criteria are established. In contrast, there are only two U.S. allowance trading programs in operation today. The SO_2 allowance system under Title IV of the Clean Air Act Amendments of 1990 took several years to design and almost five years to implement, although it affects only one highly centralized sector, the electric utility industry, and one centralized regulatory authority, the United States Environmental Protection Agency. Indeed, the initial universe of affected sources was comprised of approximately 110 discrete power plants in the United States compared to thousands that would come under a JI program for carbon emissions. Yet this system was built on more than 10 years of experience in the United States, the existence of one culture and one language, one overarching regulatory system, over 5,000 pre-existing ERC transactions, and thousands of people who have either participated in trades or attended conferences explaining how the system works. No such foundation exists to support the development of an international, inter-cultural, and multi-lingual carbon trading system.

The RECLAIM program is an allowance based system that migrated from an ERC system -- developed and perfected from 1976 through 1990. It is used in Southern California's South Coast Air Quality Management District. RECLAIM took more than five years to develop and now, under RECLAIM trading rules, SOx and NO_x allowances are traded in a small geographic region. It is worth noting that the RECLAIM program was built on a regulatory

infrastructure that supported the most ERC transactions in the United States and was supported by at least one meeting a week among regulators, industry, and environmental interests discussing how to resolve allowance related issues during a three to four year period (see Figure 2). To further illustrate the difficulties in developing an allowance system, a recent effort to extend the RECLAIM system to volatile organic compounds (VOCs) died after the stakeholders could not agree on the structure of the program. Finally, a VOC allowance trading system for Illinois was conceptualized in 1993 and has been under development since then; it is scheduled to be proposed as a regulation by August 1996 with the hope of it going into effect in 1999! For whatever reasons, allowance-based systems are hard to develop.

In fact, rather than facilitate the development of allowance programs, these early allowance programs have sometimes done the opposite by making stakeholders more sensitive to the implications of the allowance program design issues. With better understanding, the stakeholders are less willing to compromise in the development of allowance programs. Since the programs cannot go forward until every issue is resolved, the process gets longer and longer and, in some cases, dies. Allowance trading programs for VOCs in the state of Illinois and for NO_x in the Ozone Transport Region (the Eastern States of the United States) have been years in development and are not yet complete. Development an inter-state NO_x trading for the states East of the Mississippi River seems to be moving slower and slower. Allowance trading programs for SO_2 and NO_x in Europe died before the issues could be resolved.

All of these allowance trading efforts have been for individual states or small regions with close preexisting economic ties and common cultures. The prospects are dim to achieve an agreement on JI-allowances among a diverse international community of stakeholders with different cultures, legal and regulatory systems, levels of development, and economic systems.

CONCLUSIONS

There is ample proof that air trading allows emission reductions to take place more rapidly and cost-effectively. Air trading is critically important to the cost-effective reduction of greenhouse gases. At the same time, the specific form of trading must be carefully chosen or it will slow rather than speed the process.

Everything we have learned about air trading tells us that establishing an allowance program for multiple sectors in multiple countries will be an endless process that will delay or thwart our overall response to potential problems associated with climate change. In contrast, the establishment of a credit trading program can be done quickly and will accelerate reductions of GHG.

The key to the development of a regulatory framework for controlling and reducing Annex 1 carbon emissions is the development of a cost-reducing tradable permit system. The only system being seriously considered is an tradable permit system based on trading ERCs. The only system that can be designed and implemented in any reasonable time frame is an ERC system. Therefore, regulators and stakeholders should focus now on the credit trading framework and begin the development of the protocols and frameworks that will allow creators and users of reductions to develop their projects. Figure 3 illustrates how an ERC trading system can be incrementally introduced, can save money, can support the development of a carbon control regime and can lay the foundation for a broader allowance-like system.

It is both distracting and unproductive to waste time and money assessing the theoretical benefits of an allowance system when there is little or no constituency for it and substantial real-world examples exist that demonstrate the impossibility of designing and implementing such a system over any reasonable time period. The supporters of an allowance based system face a high hurdle in demonstrating that such a system can be designed and implemented across cultures, across different regulatory programs, and across different legal systems when it took several years to develop the sulfur allowance trading system in the United States. Meanwhile they have not been able to design and implement another such system during the last six years despite a considerable effort to do so.

Industry understands the value of air trading. Industry has the incentive and innovative spark to find new, cost-effective and administratively less intrusive ways to create and use reductions. Given a framework in which to work, industry will lead rather than retard the process. It is up to the regulators to agree on the correct approach and to begin to develop the framework in which this can go forward.

Industry that supports the cost-effective reduction of carbon emissions will support the ERC system. This system builds on JI and, as a result, it can be quickly institutionalized in many countries.

Those interested in sending regulators into a regulatory swamp from which almost no one emerges will love the allowance based system. This is not to say that all or any advocates of the allowance-based system want to sabotage progress toward reducing carbon emissions. Yet the last ten years of implementation experience suggest that implementation, even in one country, is difficult.

Even well meaning initiatives can backfire if not thought out. The unintended consequence of seeking perfection is to freeze both institutionalizing a regulatory regime for the control and reduction of carbon emissions and getting real reductions. This is because under the allowance based system, many, if not all, sources will unite around the cost-effectiveness banner and refuse to get high cost reductions now when the trading system will be "just around the corner."

> "Why spend £ 100 for a ton of domestic reductions today when reductions will cost 1/10 or less under the proposed allowance system, when it finally is implemented?"

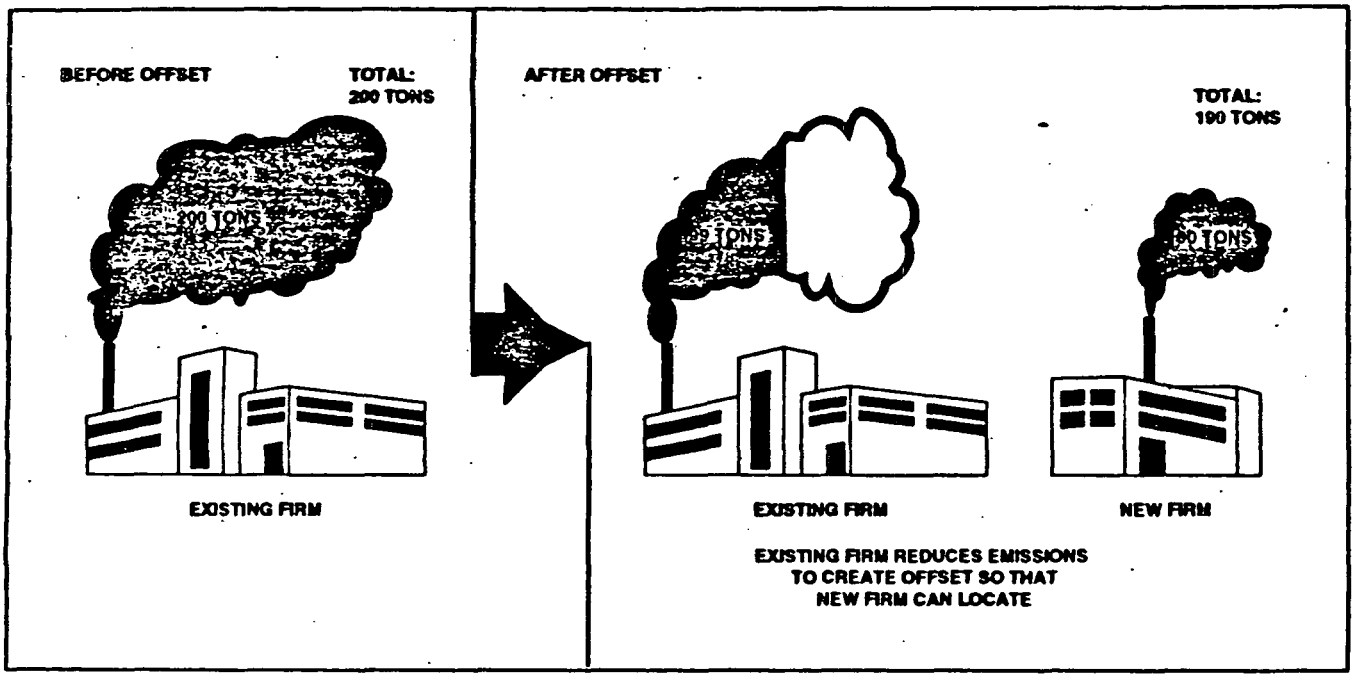
The problem for the environment is that it may never get implemented.

For anyone with a hidden agenda to abort a carbon control program, a search for perfection leads to the same outcome as an outright rejection of a carbon-control regulatory regime. After all, it is far cheaper to study and discuss how a perfect system might work in the future than comply today with a system that provides substantially all of the same cost savings.

The choice is clear -- we can start cost-effectively achieving reductions in greenhouse gas reductions starting in 2000 or we can have rhetoric forever.

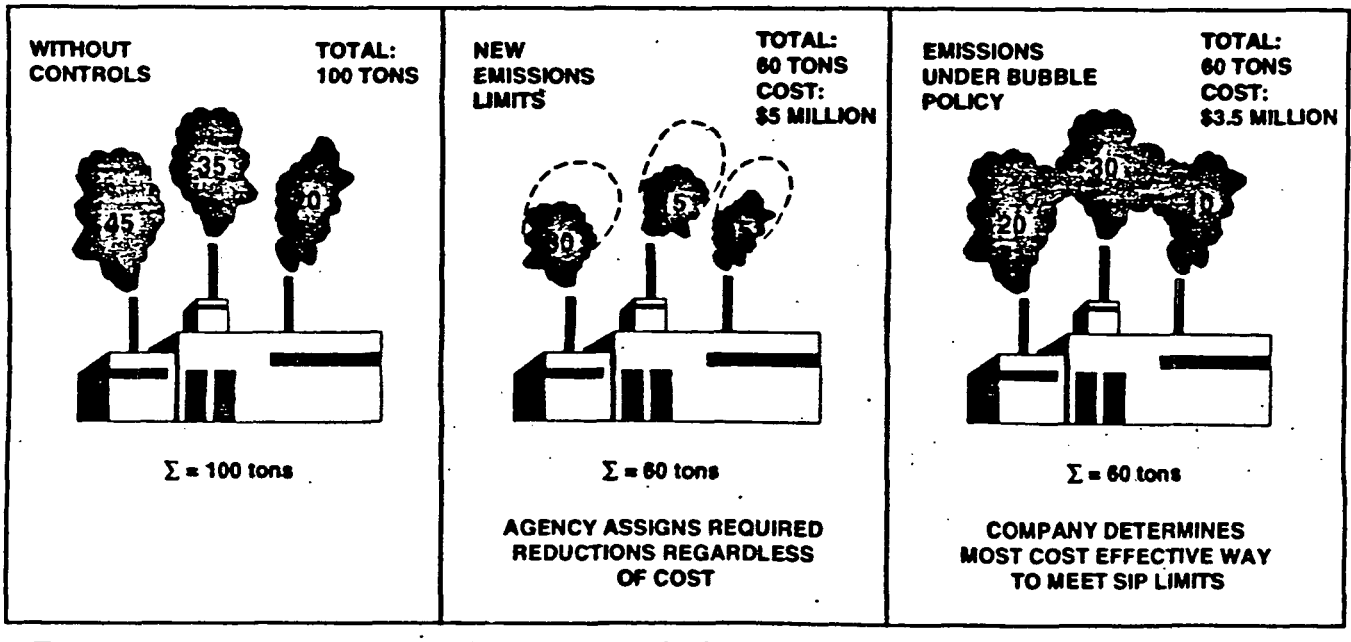
Figure 1
HOW CREDIT TRADING WORKS

EPA'S OFFSET POLICY FOR NEW SOURCES



All new sources in dirty air areas must offset their new emissions

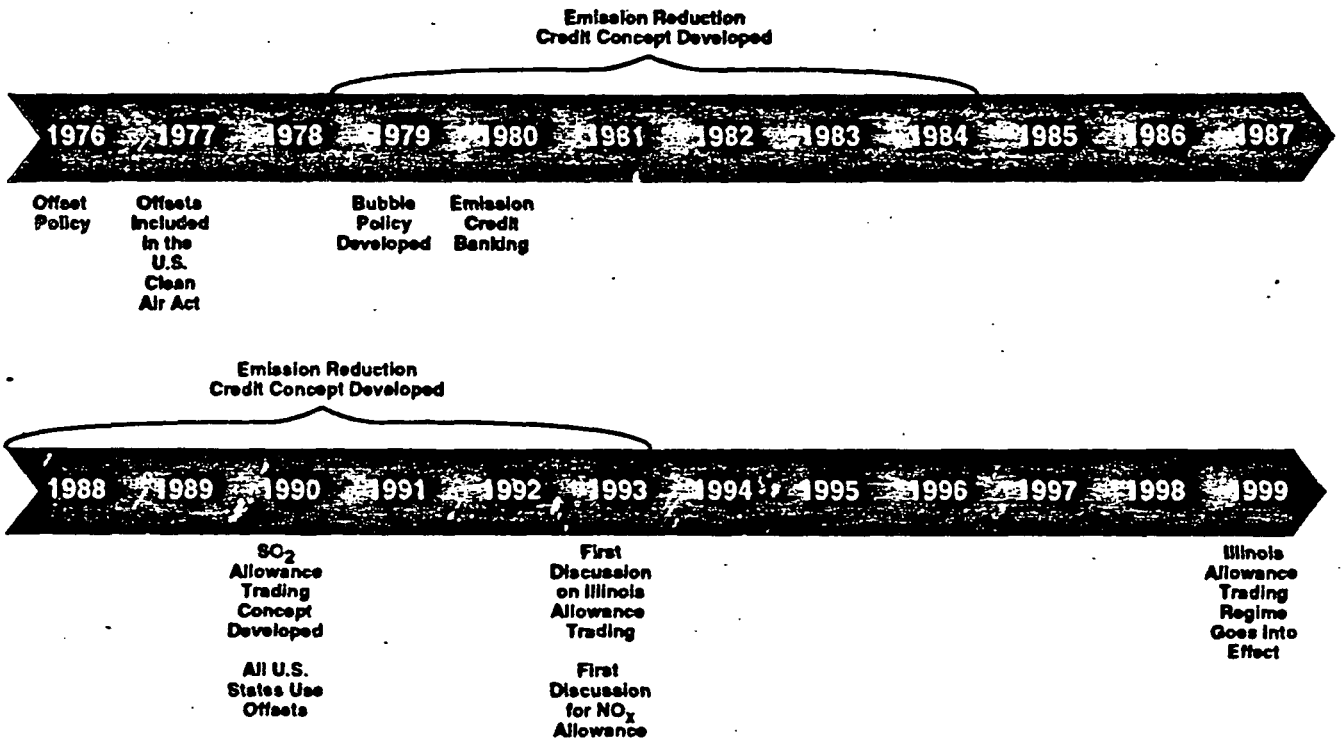
EPA'S BUBBLE POLICY FOR EXISTING SOURCES



The Bubble Concept allows for trading within a plant, company, across companies or across countries. What is traded is an Emission Reduction Credit (ERC).

Figure 2
EMISSION REDUCTION CREDITS FORM THE BASIS FOR AIR TRADING

HISTORY OF AIR TRADING IN THE U.S.



BUILDING FOR SUCCESS

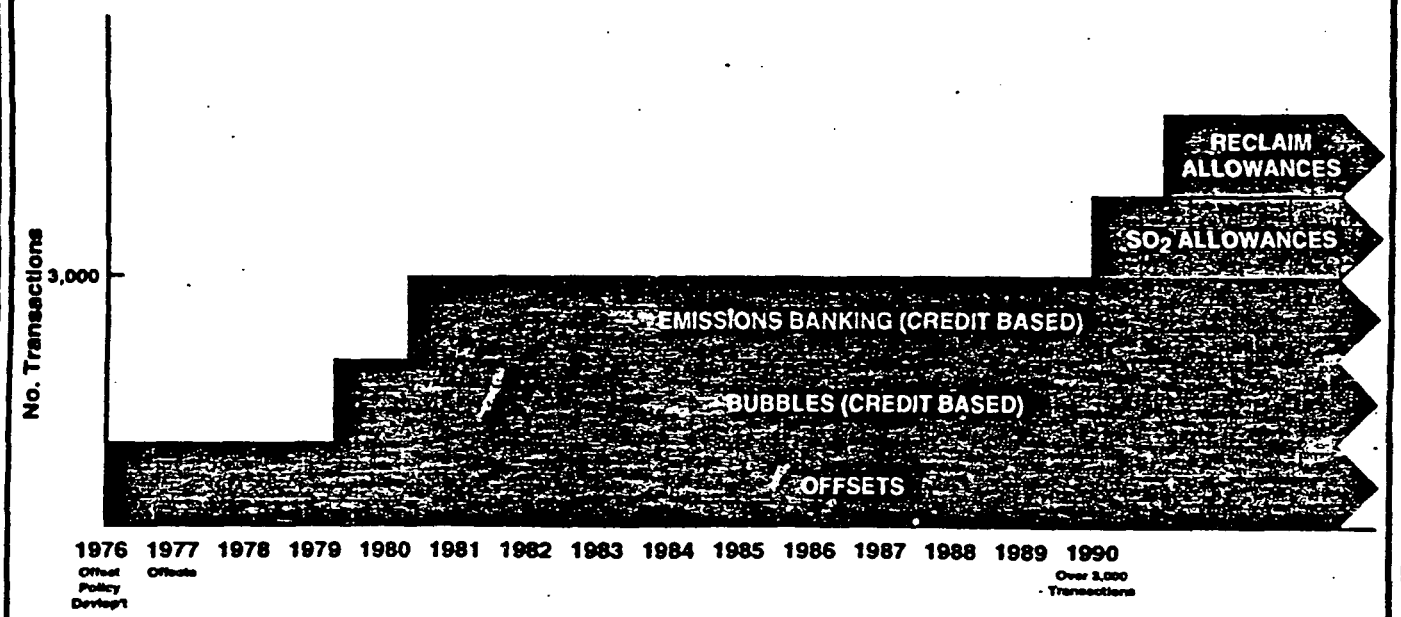
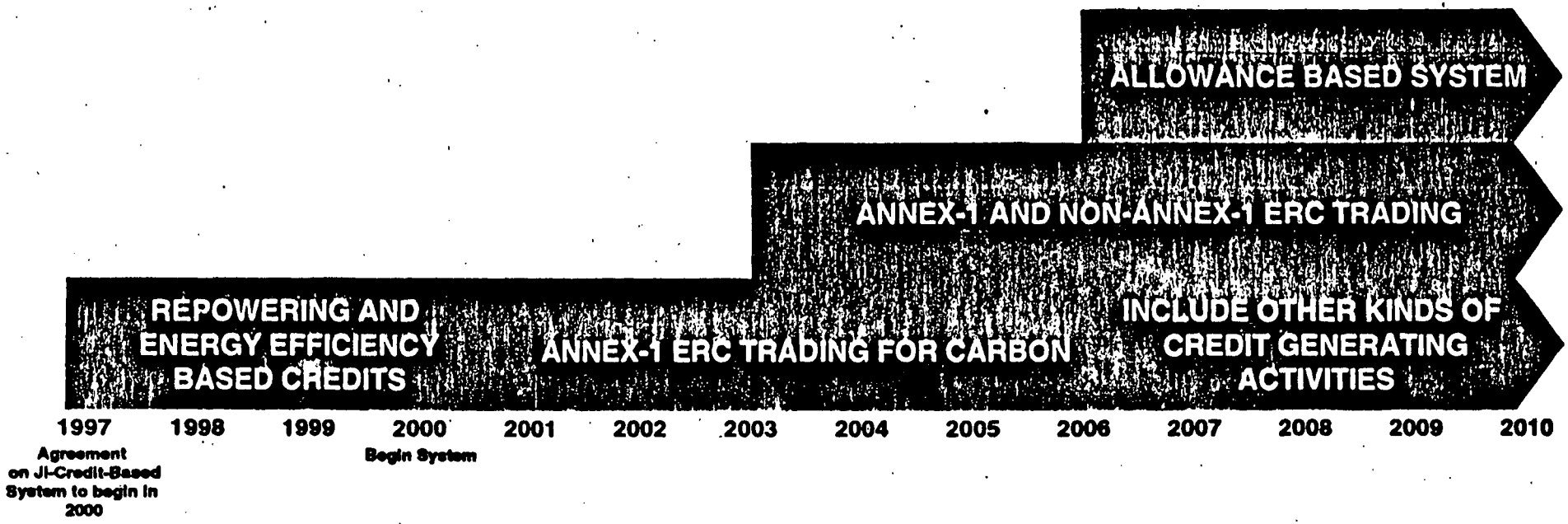


Figure 3
AN EXAMPLE:
BUILDING FOR SUCCESS
A CARBON TRADING REGIME



Environment Briefing

IEA

Establishing a Market in Emissions Credits: A Business Perspective

by

John Palmisano

IEA Environment Briefing No. 2 ISBN 0-255 36386-9

A publication of the IEA Environment Unit

The Institute of Economic Affairs
2 Lord North Street, London, SW1P 3LB

Tel: (0171) 799 3745 Fax: (0171) 799 2137 E Mail: enviro@iea.org.uk Web: http://www.iea.org.uk

The IEA is a Registered Charity No. 235 351, Limited by Guarantee, Registered No. 755808

Foreword

Scientists continue to debate whether global warming is occurring and, if it is, whether it will be harmful. In the absence of definitive answers, policy makers the world over are devising mechanisms to limit emissions of Greenhouse Gases (GHGs).

This paper by John Palmisano introduces the concept of Joint Implementation, and recommends the creation of an emissions trading system for GHGs. Although it would not establish an entirely unfettered market, this approach could potentially lower the costs of complying with the energy reductions and emissions targets under discussion.

We are pleased to offer this IEA Environment Briefing. This paper solely reflects the views of the author, John Palmisano, and not necessarily those of his employer, Enron Europe Ltd., or those of the Institute (which has no corporate view), its Trustees, Advisers or Directors.

ROGER BATE

Director, IEA Environment Unit

July 1996

Introduction

It has been over 200 years since Adam Smith first described how markets efficiently and quickly provide goods and services. As though there is an invisible hand, markets move resources to their most efficient use. From this observation and from hundreds of confirming studies, it follows that the use of markets is the most cost-effective way in which we can achieve environmental goals.

At the close of the twentieth century, there is a world-wide recognition of the power of markets to promote low-cost and high quality products and services. Although the environmental movement is only about 30 years old, there already exists a substantial body of theory and evidence which confirms the power of economic instruments to achieve regulatory goals.

Pollution charges have the potential to be a powerful tool to limit undesirable discharges into the air and water. This is the basis of many environmental programmes in the former Soviet Union and Eastern Europe.

In addition, water and air pollution can be limited by capping discharges and forcing dischargers to buy discharge permits from each other or from the state. In fact, since 1976 the United States has experimented with, and now widely employs, a variety of marketable-permit-like instruments either to attain or to maintain ambient air and water quality standards. And since their inception, out of hundreds of academic and popularised studies and articles, there has not been a single study that challenges the superior efficiency outcomes which result from using tradable permits. Reinforcing the widely held view that marketable-permit-like systems can achieve regulatory goals in a cost-effective manner are studies conducted for the United States Congress, the United States Environmental Protection Agency (EPA), the United States Government Accounting Office, the United States National Science Foundation, the United States National Academy of Public Administration, United States Library of Congress, OECD, environmental ministries in Canada, the Netherlands, and Norway, and numerous studies conducted by the United Nations. Supporting all of these analyses is 20 years of real world experience and over five billion dollars in cost savings!

1. SUMMARY

Concerns about climate change are real. While acknowledging that climate change is a complex scientific problem. the IPCC Second Assessment Report maintains its predictions that atmospheric carbon loading is linked to global warming. The IPCC asserts that this influence may alter weather patterns and potentially produce more severe storms. and will increase the likelihood of droughts, heatwaves and frosts in many parts of the world. Not only is there the potential for a general warming, but there is a threat of greater variations in temperature; variations with which natural migrations of flora cannot keep pace.

Economists. scientists and business people who call for an aggressive programme of abatement are gaining listeners while even those who advocate a more modest response acknowledge the benefits of establishing institutional mechanisms that could support obtaining emission reduction targets and firm timetables, should the science (in their opinion) support actions that dictate immediate reductions. As a result, responsible industry is considering how it should participate in the development of policies. programmes and projects that respond to the threat of climate change.

The response by industry will be varied and widespread. Not only will mitigation programmes cost money, they will shift resources, create new industries, expedite the decline of already faltering industries, and even make some currently healthy industries somewhat shaky.

Even the most modest programme will have far-reaching effects. For example, not only will there be the wider application of so-called 'environmentally-friendly' transport. energy and agricultural polices, there will be a trickle-down effect of these policies on the purchasing decisions of billions of economic agents. After all, that is exactly what 'environmentally-friendly' policies are intended to do.

There will be further application of existing clean technologies while new technologies are developed. Therefore, activities like energy auditing, which is primarily human-capital intensive, may expand rapidly rather than slowly as might be the case under a business-as-usual scenario. In addition, technologies such as fuel-cells and solar power may grow very rapidly while relatively dirty technologies decline.

Canada. Costa Rica, the Czech Republic, Germany, the Netherlands, Norway, Russia, the United States, and many others.

JI means that countries can, in some fashion, join their regulatory programmes. There are two kinds of JI activities.

The first has as its goal the creation of projects that reduce emissions in one country, A, so the reductions can be used in place of expensive emission reductions in a second country, B. By joining their regulatory programmes, cost-effective emission reductions can be 'mined' and sold to companies in another country. The full development of JI could lead to a world-wide market in carbon reduction credits and could substantially mitigate compliance costs. For our purposes, project-specific JI activities will be referred to as JI-P.

A second kind of JI project is not limited to investments that produce direct emission reductions but includes a more general form of co-operation between countries to create the infra-structure that will encourage individual projects. For example, in many countries there is inadequate monitoring and enforcement of CO_2 emitters. Developing the institutions and administrative procedures that would support specific projects contributes toward reducing emissions. Absent such systems, no project is credit worthy or enforceable. For our purposes, JI projects that encourage institution building will be referred to as JI-I. Because most of this paper addresses JI-P activities, JI and JI-P will be interchangeable unless otherwise noted.

It is interesting to note that while JI-I activities actually set the stage for projects to be developed by the private sector, non-governmental organisations (NGOs) that have heretofore been the focus of JI activities have chosen to pursue JI projects instead of institution building. This result is contrary to the notion that it is better to 'teach how to fish than to merely give a fish to the needy'. In the long-run, only after institution building is successful will industry fully embrace JI.

A second dichotomy is associated with the views of governments and other stakeholders on the issue of how JI should operate. Should JI be a government-to-government programme which aggregates demand on one side and supply on the other? Or, should JI be a business-to-business transaction which is conducted after agreements are reached between governments and under specific reporting, liability and administrative rules? Some countries prefer the former, government-to-

countries that meet the same level of legal and regulatory integrity. The evolution of a 'rolling' JI programme would also include rolling in ever more complex carbon reducing actions: first, simple projects to measure repowering and other supply-side options; then more complex demand-side projects; and finally, more complex sequestering projects.

- The integrity of the JI programme must be established from the outset and maintained throughout the life of the programme.

- No post-2000 credit should be given for transactions that occur during the experimental phase of JI.

- JI-based reductions cannot come from countries whose regulatory programme does not meet minimum standards unless and until the generator of the reduction takes on extra-national and enforceable obligations.

- Liability for meeting certain standards rests with the generator of the reduction.

- JI projects should be audited and reductions verified at least once a year.

- JI reductions should be tradable to third and fourth parties as long as no rule of responsibility, liability, or recourse is broken.

- An ongoing evaluation system should be created and employed to assess the state of the JI programme.

- Any mid-course correction to an international or national greenhouse gas regulatory regime should not go into effect within less than three years of adoption by relevant regulators.

and cultures of countries which will be major parts of the world's economic engine during the next 20 years and beyond.

Big business is international. It is outward looking and integrated into a fabric of customer and supplier needs. civic duty and conformance with local culture. JI cannot be seen as a symbol of cultural imperialism, crafted in Western-speak, marketed to the developing and non-Western developed world in Western garb. JI cannot be marketed that way and it should not be designed that way.

Only through an international partnership of business, regulators and NGOs can a JI programme that meets the above stated goals be developed and implemented as part of a greenhouse gas control programme with targets, timetables and sanctions for non-compliance.

Serious initiatives for cost-effective solutions to global climate change must be forthcoming from Western and non-Western industry. Through such a dialogue, new definitions of JI and new administrative procedures might come forward to make JI work for the economic and political structures of the 20th and 21st centuries.

Essentially, the problem is that too many greenhouse gases escape into the atmosphere. Greenhouse gases accumulate, they are persistent, and reductions today only slowly mitigate negative impacts that have accumulated over time. Greenhouse gas emissions are not location-dependent. The IPCC report concludes that it is important to curtail the quantity of emissions as soon as possible.

Economists and policy analysts have long considered how such environmental problems should best be managed. While there is never a single instrument which solves all public policy problems, the use of economic instruments such as taxes and the trading of marketable permits has been shown to be cost-effective, environmentally-friendly and equitable. Yet the tools are only effective when complemented by stringent monitoring requirements, high penalties and vigorous enforcement.

Almost every country and international organisation endorses the use of market-based environmental solutions and the author considers that any comprehensive climate change treaty endorsed by the developed economies will, of necessity, include either a tax or marketable permit component. In fact, a marketable permit component of a direct command-and-control programme has been developed under the FCCC as an experiment. The foundations of this experiment are described below.

Offsetting In cities or counties that fail to meet ambient air quality standards, firms constructing major emission sources or making major modifications must offset their expected emissions increase by obtaining emission reductions of the same pollutant from other companies.

Bubbling Bubbling provides similar flexibility to existing sources that offsetting provides to new and expanding sources. Using a bubble, a plant manager can make emissions control decisions on a facility-wide basis (as if an imaginary bubble existed over the facility) rather than on a source-by-source basis. Cheap emission reductions can be used to offset expensive ones.

Netting This permits a modified source to use ERCs from another source within the same plant in order to reduce the net level of emissions below that which is considered significant and thus avoid select and onerous new source review requirements.

Emissions trading consists of voluntary and mandatory programmes. In both attainment and non-attainment areas, firms can use emissions banking as a means to certify and store emission credits. Note, however, that all emissions trading alternatives *except offsetting* are voluntary. Offsetting is required for all new sources and major modifications in non-attainment areas. Therefore, as the definition of 'new sources' or 'major modification' becomes more stringent, more firms will be caught in the offset regulatory net.

Offsets and ERCs are related concepts. ERCs can be used to meet the offset requirement and are thus called offsets. Offsets are emission reductions created by one source for use at the same or another source to negate that source's emissions or ambient impact. Types of sources which can create emission reductions include stationary, area

Permanent	The emission reduction cannot be periodic or of a temporary nature and must endure for the life of the new or modified source to which it is applied. EPA defines a 'permanent' emission reduction as one which is assured for the life of the corresponding increase, whether unlimited or limited in duration.
Enforceable	The emission reduction and its method of creation must be enforceable by the permitting agency and the EPA. Emission limits necessary to make the reduction enforceable must be incorporated into a compliance instrument which is legally binding and 'practically' enforceable.
Surplus	The emission reduction must go beyond the level of reduction required by applicable regulations and permit conditions and must not otherwise be required by the air quality attainment plan. In essence, there can be no 'double counting' of emission reductions.

As noted above, not every emission reduction can qualify for use as an offset. Likewise, not every source that creates ERCs can trade those reductions to every other source needing offsets. The restrictions that are placed on the creation and use of offsets greatly affect the way in which offset markets function. Regulatory restrictions and oversight properly inhibit the unrestricted trading of emission reductions. Thus, offset markets have very different characteristics than ordinary commodity markets.

Since 1976, emissions trading concepts have saved US companies hundreds of millions of dollars in unneeded compliance costs with no risk to the environment. As a result, many organisations have encouraged the increased use of marketable permit concepts. It was upon this base that the US acid deposition control programme was developed. Table 1 (p. 18) summarises the results of emissions trading from 1976 through 1993.

What Table 1 illustrates and what endorsements by regulators and environmental groups suggest is that regulatory systems can be developed which foster the attainment of environmental goals, cost-effectively and rapidly, by using both economic carrots and regulatory sticks.

How did this happen? While several factors were responsible, the key to the success of each instrument was a regulatory regime that focused on:

1. attaining or maintaining environmental goals;
2. stringent review and approvals;
3. creating an audit trail so firms understand how many emission reductions they have to trade and how regulators and 'greens' could validate the authenticity of the transaction; and
4. the existence of enforcement and penalty policies with teeth.

Absent these criteria, many responsible firms sent the message to US EPA that they would shun these policies. Simultaneously, state regulators and environmental interest groups threatened to hold the implementation of these programmes hostage by protracted litigation and administrative foot-dragging until safeguards were built into the trading-oriented policies.

requirements, rather than fully reducing its own SO_2 emissions. For these extra allowances to be available, however, another utility generally must reduce emissions below its emission limit. Such a utility can sell its surplus allowances to other utilities with higher costs and earn a profit.

To assure the public of the integrity of the system, power plants must install continuous emissions monitors and regularly report their actual emissions to EPA. By capturing compliance data, EPA is able to identify non-complying facilities. If companies violate their emissions limits, firms forfeit allowances to cover the excess emissions and pay automatic fines set at several times the estimated average cost of compliance.

As part of the administrative procedures governing the acid deposition title of the Act, each utility had to file an air permit and compliance plan with EPA describing how it will meet its emissions limits. In Phase I, EPA was responsible for issuing permits and reviewing the utilities compliance plan. In Phase II, state or local agencies with EPA approved programmes issued permits and reviewed compliance plans. Permit applications and compliance plans for Phase I were due on 15 February 1993. Permits and compliance plans for Phase II were required by 1 January 1996. Utilities demonstrated compliance with decreasing SO_2 emission limits by purchasing allowances from other utilities, banking extra internally-created allowances for future use, switching from high-sulphur coal to low-sulphur coal or natural gas, installing scrubbers, shifting some electricity production from dirtier plants to cleaner ones and encouraging more efficient electricity use by customers.

Given the programme's design - continuous emission monitors, high penalties and a strong permitting system - Title IV virtually ensures that the desired amount of emissions reductions will occur, whether or not the emissions trading system functions as expected.

Experience with Title IV has been very good. Compliance costs have been less than expected and reductions in SO_2 have been achieved.

Reviews by environmental organisations, academics, the US Office of Technology Assessment, and the US Government Accounting Office confirm that EPA has been successful in administering an environmentally rigorous and cost-effective system to achieve emission reductions.

prices fell below $100 a ton. The 'invisible hand' of the market directed resources to the most cost-effective control strategies and hence to lower-cost SO_2 allowances.

TABLE 2

Summary of SO_2 Allowance Price Projections

NAME	Middle Prices, Phase I	Middle Prices Phase II
Labour union: United Mine Workers	981	-
Ohio Coal Development Office Consultancy	785	981
Trade association: EPRI	688	-
AER*X: industry opinion survey in 1990	453	542
Coal-based electric utility: AEP	392	589
Consultancy: RDI	309	374
Coal-based electric utility: Allegheny Power	302	807
Consultancy: EVA	202	605
Consultancy: ICF-1	185	472
Consultancy: ICF-2	118	318

Note: From Hahn and May, *The Electricity Journal*, March 1994.
Some 'middle' prices are the average of the projected low and high case scenarios.

5. What is JI?

Joint implementation (JI) refers to those activities which countries jointly develop to mitigate greenhouse gases. The concept permits one country to over-control emissions or create greater carbon absorption capacity and trade these carbon reductions to a second country. The concept is almost identical to the concepts underlying emission credit trading and SO_2 allowance trading. The specific legal mechanism for establishing a JI system is based on two processes being established: one deals with a system of emission rights (an accepted emissions cap) and the second is a system of obligations in which the extra-fulfilment in one country can be substituted for an obligation in another country.

One reason for a JI transaction is that one country faces high-cost emission reductions while another has many low-cost emission reduction opportunities. Other countries and companies might participate in JI transactions to curry favour with politicians or green organisations, or because of an ambiguous commitment to good corporate citizenry. Whatever the reasons that partners trade, it is self-evident that both parties view the transaction as beneficial.

While trading of reductions may not be in the exact language of the implementing international agreements, the 1992 UN Framework Convention on Climate Change (FCCC) does allow the possibility of JI between Parties to the convention. Unfortunately, the legal and institutional settings for JI transition were left undecided until March 1995 at COP I in Berlin. Though COP I only led to the adoption of rules governing a pilot phase (AIJ), the identification, cultivation, design, seeking of funding for, implementation and documentation of JI projects has grown from a cottage industry to an emerging business for NGOs and a few private sector entities playing the intermediary role. For a description of JI see Box 1 (page 63); for examples of two JI projects, see Boxes 2 and 3 (pages 64-65).

But what in fact is JI? Is it a wolf in sheep's garb or is it the harbinger of a more cost-effective greenhouse gas control programme and, therefore, an element of a comprehensive strategy which could lead to politically acceptable limits on greenhouse gas emissions?

experimental period. Yet, curiously, a substantial amount of data exists upon which decisions could be made:

- thousands of NOx, SOx, CO and hydrocarbon trades have been conducted in many jurisdictions throughout the United States from 1976 through 1995;
- hundreds of studies of this data have been conducted by academics and international organisations which endorse the continued use of marketable permit-like programmes; and
- the replication of the economic incentive model to more and more applications has taken place throughout the OECD countries and the transitional economies.

Instead of looking at these impressive results and making regulatory decisions based on these data, valuable time is being lost while a new generation of governmental officials and NGOs experiment with JI and learn by doing instead of learning by reading. Instead of learning from practitioners who have been creating and trading emission credits, the world community is intent on re-inventing the regulatory wheel.

Today, Norway, the Netherlands, Germany, the United States, Costa Rica, Honduras, Belize, Bhutan, Hungary, Poland, the Czech Republic, Ecuador, Finland, Sweden, Japan, Iceland, Australia, Canada and Russia all support JI projects. While each country has its unique view of JI, it suffices to say that JI has substantial and powerful supporters.

The Netherlands views JI as a private sector endeavour, especially after the pilot phase. Therefore, the Netherlands Cabinet invited private companies to participate in the Netherlands pilot-phase programme and to propose suitable projects of government registration. However, recognising the absence of FCCC-based incentives, some Netherlands-based incentives have been included in the programme.

The Netherlands permits the formal registration of suitable projects and the certification of JI emission reductions or sequestration efforts. At an inter-ministerial level this system of registration and certification is now being worked out. The Netherlands Cabinet announced that Netherlands companies can use certified emission reduction or sequestration efforts as part of future agreements with the Netherlands government. For example, certificates could play a role in further Long-Term Voluntary Agreements on Energy Efficiency Improvement for the period after 2000. Recently, the Cabinet presented its third White Paper on Energy in which a more than 30 per cent efficiency improvement target was set for the period up to 2020. It is likely that JI-based reductions could be used to meet that target too.

To promote JI, the Cabinet decided to allot a special budget for support of JI projects in Central and Eastern Europe and also in developing countries. For the period 1997-1999, on an annual basis 12 million Netherlands guilders will be available for funding and leveraging JI projects in Central and Eastern European countries. Furthermore, in the period 1996-1999, also on an annual basis, 12 million Netherlands guilders are available for support of JI projects in developing countries.

The Cabinet decision allows for support of JI projects within the existing fiscal system of accelerated depreciation of environmentally-sound capital goods. Furthermore, a report will be prepared on whether or not the 'Green Stock Fund' investment scheme will be a suitable instrument to promote taxation and therefore gain increasing popular interest in the Netherlands.

Finally, the Cabinet also decided to continue its efforts for increasing support for the instrument of JI, both at national and at international levels. Also in the coming period, the Netherlands is prepared to contribute actively to support meetings which focus on dissemination of information on JI and intends to provide useful input to the FCCC process.

The implementation of the Netherlands JI pilot-phase programme will be a combined effort of several ministries. Therefore, close inter-departmental co-ordination is foreseen.

First, the Ministry of Environment is strongly involved. It is developing a system for registering projects and certifying results. Furthermore, the Ministry of Environment will be responsible for compiling an annual report on the progress of the Netherlands pilot phase. This report will be sent to Parliament and the Conference of the Parties. The ministry will annually certify the results of the project towards participants. These can be companies, governmental organisations or NGOs. Finally, the ministry will be responsible for initiating further research projects, communication like the Joint Implementation Quarterly of the Foundation Joint Implementation Network and funding conferences and workshops. Some of these tasks will actually be performed by an external agency, a so-called JI Service Centre. The centre will be set up to provide the necessary logistical support for the ministries involved for the period until 1999.

Also the Ministry of Economic Affairs, which has the main responsibility for the Netherlands' bilateral support programmes for Central and Eastern European countries, will participate along with the Ministry of Foreign Affairs, which has the main responsibility for the assistance programmes for developing countries. Identification, selection, financing and monitoring of project results will be the main responsibility of the Ministry of Foreign Affairs.

In respect of JI projects now endorsed by the Netherlands, there are many ongoing activities. The geographical distribution of these projects is quite balanced with three projects focusing on sequestration via afforestation, while the other projects deal with emission reductions, both carbon dioxide and methane. All projects are based on a mutual written agreement between the hosting government and the Netherlands government. They range from large projects like forestry, aimed at reforesting about 150,000 hectares in the coming 25 years, to two small projects in the Russian Federation and Hungary.

The Netherlands has been at the forefront of developing JI concepts and projects. In all respects it has been, with Norway, among the leaders in Europe in advocating JI as a complement to the FCCC.

- encourage participating countries to adopt more complete climate action programmes, including national inventories, baselines, policies, and measures, and appropriate specific commitments.

The programme is run by an Inter-agency Work Group and an Evaluation Panel. The Inter-agency Work Group is responsible for overall policy development on JI. The Evaluation Panel is an independent technical review body composed of representatives from US federal agencies - the Department of Energy, Environmental Protection Agency, Agency for International Development, Department of Agriculture, Department of Commerce, Department of the Interior, Department of State and Department of the Treasury. The Evaluation Panel makes final decisions on whether projects qualify for USIJI status. The Evaluation Panel also has the discretion to approve operational protocols and methodologies, and preliminary evaluation criteria. The Evaluation Panel started to accept JI proposals in 1994. Accepted projects receive certificates of recognition and further instructions for reporting under the programme.

Eligibility requirements are simple. Any US citizen or resident alien is eligible to participate in the USIJI process. So too is any company, organisation or entity incorporated under, or recognised by, the laws of the United States. Other organisations such as any US federal, state or local government entity can participate in USIJI projects. Foreign partners can include any country that has signed, ratified or acceded to the United Nations Framework Convention on Climate Change and any citizen or resident alien of a country identified above. Any company, organisation or entity incorporated under, or recognised by, the laws of a country identified above, or any national, provincial, state or local government entity of a country identified above can also participate.

But what are the benefits of the USIJI pilot programme? The government's marketing materials (see Box 4, page 66) claim that there are many benefits, including:

- input to development of international criteria for JI;
- public recognition:

Since 1994, the US Government has entered into many bilateral agreements with countries in various regions of the world, which are designed to facilitate the development of JI projects. These Statements of Intent provide a framework for governments to co-operate to promote private sector investment in projects which, according to the rhetoric, fuel economic growth and produce environmental improvements.

The first agreement signed was a Joint Statement of Intent between the US Department of Energy and the Environment and Urban Affairs Division of the Islamic Republic of Pakistan.

The second agreement was with the Government of Costa Rica. The agreement was signed by Vice President Al Gore and Costa Rican President Jose Maria Figures. It emphasised energy efficiency and renewable energy technologies, sustainable forest management, expanded information, and education and training. The agreement also encouraged the Governments to seek innovative financial arrangements to increase private sector investment, to develop new kinds of partnerships, and to provide needed incentives to promote JI. This agreement became a model for other agreements between the US and the seven Central American countries.

In October 1995, an Annex to the original Statement of Intent was signed. This Annex called for both parties to explore ways to reduce transaction costs associated with developing JI projects.

In March 1995, the US Department of Energy signed a Statement of Intent with the Chilean National Energy Commission and in June 1995, officials from the US, Costa Rica, Nicaragua, Guatemala, Honduras, El Salvador and Belize signed the first regional international agreement to co-operate on joint implementation.

In October 1995, an agreement was signed by the US and the Government of Bolivia. This agreement, like all the others, is quite formal. The agreement is summarised in Box 5 (page 67) to give the reader a flavour of the contents of these agreements that enable JI projects to take place.

In December 1995, the United States Department of Energy announced the selection and endorsement of eight JI projects to be USIJI projects. The eight projects were selected from among 21 proposals submitted to the US Government. The

the National Institute of Biodiversity and the Nature Conservancy will participate.

4. Costa Rica: Dona Julia Hydroelectric Project

The project will construct a 16 MW hydroelectric plant in northern Costa Rica, replacing facilities that burn fossil fuels. The project will displace 30 MW thermal units burning high-sulphur diesel fuel, bunker and other heavy fuel oils. During the first five years of operation, the hydroelectric plant is estimated to produce a net carbon reduction of 314,000 metric tons of CO_2.

5. Costa Rica: Tieras Morenas Windfarm Project

The same participants as in the Dona Julia hydroelectric project are also involved in a wind farm that can generate 98 gigawatt-hours annually. By displacing 30 MW thermal units, 100,000 tons of CO_2 emissions per year will be mitigated.

6. Nicaragua: El Hoyo Monte Galan Geothermal Project

This project involves the construction of a 50 megawatt power plant, on line in mid 1999, to be expanded to 105 megawatts within two years. Energy is obtained from hot water brought from a reservoir by deep wells. The project decreases the emission of global heating agents, as well as Nicaragua's dependence on fossil fuels. Participants are C&R Inc. from Managua, Nicaragua, and the Trans-Pacific Geothermal Corporation from the United States.

7. Honduras: Bio-Gen Biomass Power Project

The Honduran Bio-Gen Corporation will develop a 15 MW waste-to-energy plant near a forest products processing region in Guaimaca, Honduras. Long-term contracts for both input and output guarantee have been signed, ensuring a stable economic environment. Prevented emissions of CO_2 amount to at least 113,500 tons annually. Other participants include the Nations Energy

Secondly, project financing makes sense because the large transaction costs can only be justified if the returns are also large. The little projects we have seen so far would be uninteresting as investments - they are too small, too risky and the returns are unknown and. hence, are un-hedgeable. Project financing is interesting because the risks and uncertainties involved in balance-sheet financing may not be tolerated for large JI investments - even large companies. It is one thing to play with 'free money' from multi-national donors or foundations, or use the 'soft money' that is chasing green-PR; it is quite another thing to be putting conventional sources of capital in an investment that must compete against other large investments for funds. It makes sense, therefore, to look to the experience of project financiers to identify the elements of successful projects and to understand the circumstances in which successful projects can be developed.

When a business person considers a project-financed investment, that business person insists on a single source of repayment, a strong cash flow (or its equivalent), limited recourse to the project's sponsors, and risks that are shared among all the participants in the project.

There are a number of reasons why project financing is employed and all of these reasons apply to JI. First of all, it is a well-established and successful lending methodology. Secondly, it results in the lowest, most predictable flow of funds.

Project financing is also used because it is a discipline that isolates risks. Due to the detailed structuring involved and the exhaustive due diligence conducted by all participants, project finance enforces a discipline on the borrower and the lenders. As a result all participants, especially the host country and the purchaser, will understand better their risks and rewards. Project finance also provides the flexibility to develop unique solutions for very specific risks, and for JI projects this feature could be very important.

Also there are a number of benefits associated with the participants. Typically, the sponsors are well-known to the lender from their activities elsewhere in the world. Only sponsors with an established and successful track record are able to borrow. Lenders benefit by having a strong, local ally who has even more incentive to see the debt repaid. The project's sponsors represent a first line of defence against the costs

climate to support JI investments. The ways to make a market more conducive to the application of the project finance methodology for JI include:

- develop an inter-ministerial consensus and exhibit strong government support for both the proposed JI project and the legal and financial structure;

- Clarify all applicable laws and regulations;

- Enhance lender collateral and foreclosure rights (this is a worrisome matter when we are talking about a JI project);

- Since these are secured transactions, modern systems to assess pre-existing liens and perfect new liens must be established;

- Develop legal policies to ensure the sanctity of contracts and the enforcement of international judgements; and

- Finally, it is important to improve laws concerning due process for foreign equity and debt investors.

Clearly, the proper paradigm for viewing JI projects is the project-financing paradigm and this is a model that many business people know quite well. One must recognise that this model may be quite off-putting to the larger NGO community which has heretofore been sponsors of many JI projects. Nevertheless, project-financed JI activities will represent a large percentage of future JI projects.

competitor against new ideas, but also because there is usually only the smallest constituency for a non-traditional approach to regulation. Lack of knowledge impedes the expansion of the reform and, despite the evidence, legislators, policy-makers and other stakeholders may be wary of expanding the use of economic instruments for which there are only undocumented theoretical linkages to environmental improvements. Evaluation can be used to document the use of economic instruments, thereby enhancing their credibility with stakeholders and contributing to decision-making. It can also point out discrepancies between ideal and actual performances, adding weight to the credibility of the instruments.

Evaluation is basically a comparison of expectations against outcomes. One form of evaluation is a snapshot of what happened. It is a look back at outcomes measured against predetermined standards. A second evaluation model is that of real-time feedback systems that provide both periodic snapshots and opportunities for making mid-course corrections.

While most people are familiar with the simple snapshot evaluation, serious businessmen and policy-makers are committed to the latter. By establishing measures for success and by collecting data on progress toward, and deviations from, success, serious managers are able to correct deficiencies and reinforce progress.

As noted above, JI is being tested through an experimental programme called AIJ. AIJ is voluntary and, under almost any imaginable circumstance, JI will be voluntary. There has never been any discussion of mandating trades nor does such a system make sense. Therefore, it is safe to assume that companies or countries will only become involved if those activities are mutually beneficial.

An interesting question, then, is how should the AIJ programme and previous JI project be evaluated? Since JI has been advocated to promote cost-effectiveness in the underlying environmental programme, the only criteria that it makes sense to use are environmental and non-financial external costs, such as the costs on the part of regulators to administer a JI programme. Of course, regulators and environmentalists would want to learn if goal-attainment was promoted, inhibited or thwarted. Observers would also be interested in hidden costs, administrative costs and any non-financial external effects.

For example, once property rights or quasi-property rights are allocated, as would occur under a full-blown JI programme, measuring the attributes of the marketable permits and rules governing their transfer becomes more important than engineering rule writing. Old, and formerly high-valued skills like engineering skills, become replaced by management information systems skills.

Resistance to the development of the marketable permit programme can come from those inside the implementing agency who represent the 'ancient regime' while the institutional beneficiaries have yet to form coalitions inside or across regulatory agencies.

Yet in spite of their self-serving concerns, most regulators support the use of economic tools like JI. During 1993 and 1994, the United States National Academy of Public Administration (NAPA) conducted a comprehensive study investigating the administration of economic instruments in the United States and Russia. The Advisory Board for the NAPA study included many former US EPA leaders and respected state and federal environmental professionals. The study concluded with a strong endorsement for both economic instruments like JI and the use of evaluation tools in the design and operation of such systems.

NAPA assigned a variety of benefits to evaluation:

- Evaluation provides data essential to changing the knowledge, attitudes and behaviour of those implementing economic instruments.

- Evaluation programmes are strongest when they stipulate in advance clear-cut objectives, responsible activities and measures for their implementation and their expected effects.

- Evaluation activities focus attention on results.

- An effective evaluation programme is concurrent rather than projective.

- Evaluation must be systematic and continual in the programme, not ad hoc.

Properly established, ongoing evaluation will be critical to the evolution of post-2000 JI, from core developed countries to less developed regulatory circumstances.

conducted; and present both data and conclusions. The appendices should include a one to two page description of every JI and AIJ project and a similar description of groups of JI projects that are seeking funding. A standard format should be used to collect, organise, analyse, and display data. To the extent possible, common assumptions should be employed in the analysis.

Of course, all of the above are just mechanics. Getting agreement and an audience and a consensus of expectations is difficult. And that is where business and the regulatory community add value. For at the end of the day, it will be national regulators that will develop the rules governing JI and it is business that must be sold on investing in JI projects. That is why getting business and local regulators involved during the take-off will ensure a good regulatory landing.

11. What Other Effects will there be on Business?

A climate change treaty will create a variety of winners and losers. The winners will generally be those companies that provide cost-effective and administratively simple solutions that fit within the new regulatory framework.

Winners will also anticipate what will happen once the climate change treaty is approved so their products and services will be tuned to the regulatory-driven needs of customers.

The exact response of complying companies will depend on the regulatory targets, timetables for compliance and the flexibility in the programme. The response by companies will differ because the magnitude of their control responsibilities differs. For example, large multi-national companies will, no doubt, conduct a world-wide audit of their greenhouse gas control obligations and commence the development of facility level carbon control strategies, and then build up their strategy to the national and international level. This 'planning response' was what derived from the US acid deposition control programme and it is logical that other multi-billion pound companies that must comply with a carbon-reducing regulatory regime will first assess the scope of the compliance problem and then plan a response before embarking on a multi-million pound compliance programme.

Compliance strategies to be investigated are likely to range from fuel-switching and transportation control measures to the generation and use of carbon reductions credit trading and mandatory technology solutions.

For large organisations, a control strategy will be developed that governs many decisions to be made over the next 10-15 years. Of course, some flexibility will be built into the system, but large companies will not want their regulatory fate to be in anyone's hands but their own.

This means that the world-wide demand for engineering, financial and business consultants will increase for the first three or four years of the programme. After that, industry will have developed the human capital and systems to manage their compliance response. Once the initial analysis of carbon mitigation options has been

12. Conclusions

It has been argued that the position of companies which want JI-based reductions in carbon emissions is similar to the position of companies whose products and services provide JI-based carbon reductions. They both want a JI programme to be simple, non-intrusive, certain and conducive to risk-management. Using these attributes, and understanding the needs of regulators to assure good environmental outcomes, it is concluded, therefore, that from a business person's perspective JI must have the following attributes.

1. A 'Gold Standard' - The Common Currency must have Integrity

Any traded reduction under a JI programme must be real, surplus, measurable, auditable and certifiable as measured under internationally accepted standards. Otherwise, JI reductions will be suspect and non-transferable to other parties once created and transferred to the first party. Just as the adage states: 'One rotten apple spoils the barrel.'

Any defective JI reduction will discredit the entire system in the eyes of the regulator, the environmental NGO and the public, resulting in the abandonment of the JI programme.

2. A System for Managing Risks for Industry and Regulators

The integrity of the JI programme must be established from the outset and maintained throughout the life of the programme. Therefore, JI should be implemented in a step-by-step fashion: first with countries that share common legal, financial and environmental programmes of similar integrity; then including other countries that meet the same level of integrity. The programme's credibility must be earned by the emergence of a pan-national system of equivalent integrity, based on similar (if not identical) measurement systems, and supported by comparable legal and administrative systems. While moving hardware across countries and cultures is not always easy, transferring or developing equivalent legal and administrative systems is very difficult. Since developing comparable systems requires time and vast experience, these systems should be first implemented in countries that have relatively

driven by electricity trading could promote the required infra-structure before then. A success in the Nordic region with both electricity trading and JI could encourage Poland. Lithuania. Latvia. Estonia. and the Kaliningrad oblast to participate beginning in 2000 or 2001. thus forming a Baltic-ring for both electricity trading and carbon trading.

A similar implementation programme could be developed in North America (see Table 5. page 56). The US and Canada could, with relative ease, establish cross-country agreements for trading carbon reductions. The activities that derive from this exercise will coincidentally define the terms and conditions for other North American countries who want to participate in JI activities. Since those entering the larger North American 'bubble' will be net sellers of emission reductions, they will find it comparatively easy to assess what they must do to meet eligibility requirements and what the costs of doing so might be.

Other region-wide carbon-trading regimes could be developed around the world, each building off of a nucleus of two or more countries that have similar cultures, substantial bilateral trade and similar interests in managing greenhouse gases.

The logic for the incremental approach described above is that industry and other stakeholders demand confidence in a JI programme before substantial money flows and trust is manifest. By proving the worth of each bilateral programme, a world-wide and integrated programme is most likely to eventually succeed.

3. No Back-Sliding, No Credit for Pre-2000 Activities

To maintain the credibility of the post-2000 JI programme, no post-2000 credit should be given for transactions that occur during the experimental phase of JI, and no JI-based reductions should be allowed from countries whose regulatory programmes do not meet minimum regulatory standards unless, and until, the generator of the reduction takes on extra-national and enforceable obligations. These provisions reinforce the integrity of the system.

4. Liability Rules

Who should have the responsibility of ensuring that carbon reductions generated through a JI project are genuine? Since the liability for meeting carbon reductions will rest with individual companies covered by the carbon regulatory programme, liability for meeting the terms and conditions associated with JI carbon reductions therefore should rest with the generator of the reduction. No other organisation will have the quantity and quality of information about the JI project. Therefore, the generator is in the best position to understand the quality of and limitations on the project. Thus the generator should be assigned the liabilities associated with the quantity and quality of reductions.

5. Audit Trail and Certifications

JI projects should be audited at least once a year. The audit protocol should be defined in advance and should be based on a review of records as well as field testing. To ensure compliance, the audit should be conducted by a third party to certify compliance with national and international regulatory requirements. Of course, the auditor would incur some liabilities for malfeasance or fraud.

6. If JI Reductions meet the Gold Standard, Trading of Reductions might be Possible

Strips of JI reductions could be tradable to third parties as long as no rule of responsibility, liability, or recourse is broken. Applicable rules governing subsequent transactions should be consistent with the rules governing the initial transaction.

is due, in part, to the lack of understanding on the part of NGOs of how business works, how business evaluates projects, and why business would select a project for an investment. By focusing on the infrastructure issues *now*, NGOs can prepare the institutional soil in which JI projects will grow.

Develop the concept of a rolling JI programme

JI is complex and it will not suddenly emerge as a finished product; instead JI will evolve. There must be a set of criteria and a schedule for 'rolling-out' a post-2000 JI that produces accreditable emission reductions. This would be a programme whereby certain kinds of projects become eligible for JI accrediting in years 1 and 2 of the programme, while other kinds of projects become accreditable in years 3 and 4, and still others are permissible in years 5 and 6. While the programme itself would slowly expand to include more qualified countries, the programme would also expand to include more and more qualified projects.

Table 6 (page 60) offers one version of how a rolling-JI programme might look. It shows three emerging JI markets becoming integrated in 2003, once regulatory and legal systems have been perfected in each of the three relatively homogeneous regions. After cross-country reductions have been made viable and there has been experience with more complicated JI activities, even more complicated JI activities, such as demand-side management projects, can be introduced.

The three actions outlined above are simple. There is no constituency fighting against an evaluation of JI, the building of the infra-structure that supports good regulatory programmes, and the developing of a rolling JI programme. From these three simple activities derive many subsidiary activities. And from the successful completion of the subsidiary steps flows change. Nevertheless, to effect change, these actions require the immediate involvement of the world-wide business community.

13. What are the Logical Steps for Advocates?

Advocates for JI cannot just argue the superior efficiency properties of JI. Regulators and NGOs have legitimate questions regarding the enforceability of international contracts, the reality of claimed reductions and the comparability of environmental protection programmes among the diverse countries of the world. These concerns must be answered simply and thoroughly.

Advocates for JI must reach out to the adversary community. Advocates must provide facts that support their position and change elements in their advocacy position when supporting facts are absent. Unfortunately, the debate over JI has not been a dialogue, nor has it been much of a debate. Instead of arguing, the parties are talking amongst themselves or, often, past each other. One party argues for JI on cost-effectiveness grounds, another argues against JI on the grounds of equity, while a third argues that JI might be either too onerous or simply not cost-effective. There are few opportunities where advocates and adversaries isolate areas of agreement and attempt to resolve disagreements.

Advocates for action on mitigating greenhouse gases must hold their adversaries' feet to the intellectual fire. It is not fair for those who would slow progress toward reducing carbon and other emissions to imply that the cost of such programmes would either end civilisation as we know it or retard the economic progress of the developing world. The experience with air credit trading confirms that the market process produces solutions which cost a small fraction of that projected by simulation models. In addition, if new technologies are promoted, as they will be, the developing world may be the primary beneficiary.

Certainly, there are some advocates for JI who will argue for a less than rigorous programme. There are people who, even when saving 50-75 per cent through a rigorous JI programme, want even cheaper JI reductions that flow from weakly designed, poorly developed and unenforceable projects. There are people who support self-enforcement, weak penalties and modest audit requirements. And while it is true that this would reduce the cost of compliance, so too would no control programme at all! Responsible companies understand the need for rigour and the consequences of laxity.

BOX 1
What is JI?

The concept of Joint Implementation (JI) was introduced early in the negotiations leading up to the 1992 Earth Summit in Rio, and was formally adopted into the text of the United Nations Framework Convention on Climate Change. The term JI has been used subsequently to describe a wide range of possible arrangements between interests in two or more countries, leading to the implementation of co-operative development programmes or projects that seek to reduce or sequester greenhouse gas emissions. Many countries have supported JI projects before and since the coining of the term.

In October 1993, the United States announced the US Initiative on Joint Implementation (USIJI). Draft ground rules for the USIJI were published for public comment in the Federal Register in December 1993 and the final ground rules were published by the Department of State in a Federal Register notice in June 1994. Several countries have also announced JI pilot programmes.

At the Berlin Conference of Parties in 1995, the JI concept received only mild support. but still there was enough to introduce a pilot phase for JI. The pilot, however. has several restrictions which have limited companies' enthusiasm to participate.

- First. the pilot phase would be for Annex I Parties and on a voluntary basis among non-Annex I Parties.
- Second. all JI projects require prior acceptance and approval by the governments of the Parties participating in the project.
- Third. the results must be real. measurable and not otherwise to have occurred.
- Fourth. the projects must involve additional finance..
- Fifth. *no* credits shall accrue to any party during the pilot phase from any activities implemented jointly.

The Parties involved in an AIJ activity are encouraged to report to the Conference of the Parties through the Secretariat using the framework established in early 1996. This reporting shall be distinct from the national communications of Parties. The Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation will prepare a synthesis report for consideration by the Conference of the Parties at its annual session to review the progress of the pilot phase.

JI is now referred to as AIJ, Activities Implemented Jointly, but the terms seem interchangeable.

BOX 3
The Rio Bravo Pilot Carbon Sequestration Project

The Nature Conservancy. Programme for Belize and Wisconsin Electric Power Company submitted a proposal for the Rio Bravo Pilot Carbon Sequestration Project to the US Initiative on Joint Implementation (USIJI) on 4 November 1994. The project was one of seven approved for the first round of the USIJI on 30 January 1995. It was also approved by the Government of Belize, a party to the United Nations Framework Convention on Climate Change (FCCC).

The Rio Bravo Pilot Project will manage an extensive tropical forest as a 'carbon sink'. The project will demonstrate a credible, accountable strategy to promote beneficial climate change while maintaining an optimal balance between carbon dioxide sequestration, forest timber management and environmental protection. It is designed to conform to the requirements for registration of carbon offsets under Section 1605(b) of the 1992 Energy Policy Act, as well as the sustainable development mandate for the Rio Bravo, established by Programme for Belize and confirmed by the Government of Belize.

Underlying the participants' involvement in the project is a belief in the climate change mitigation effect. PacificCorp, Cinergy and Detroit Edison hope to demonstrate that a voluntary programme of market incentives can be a legitimate approach to ensuring greenhouse gas mitigation. As a central element to ensure that this objective is achieved, the project will include rigorous monitoring and verification.

The project has two components:

Component A includes the purchase of a 15,000-acre parcel of endangered forest land that links two protected properties with Rio Bravo. The greenhouse gas benefit of this purchase is estimated conservatively at three million tons of carbon dioxide.

Component B implements a sustainable forest management programme at the Rio Bravo Conservation and Management Area. The programme is designed to increase the total pool of sequestered carbon in a 120,000-acre area of Rio Bravo, including the area of Component A. It will then seek to extend the sustainable forestry model into the adjacent properties. This component also includes plans to develop and implement a marketing strategy for sustainable timber extraction.

BOX 5
Elements of the Agreement between Bolivia and the United States

The United States and the Government of Bolivia recognised that controlling greenhouse gas emissions, to limit potential adverse climate change impacts, would be mutually beneficial. Both will benefit from the diffusion and use of sustainable energy and greenhouse gas emission reduction and sequestration technologies and practices. They perceive the potential for additional investment in environmentally, socially and economically sound development through private sector participation. They also intend to facilitate the development of joint implementation projects which should encourage the market deployment of greenhouse gas-reducing technologies, energy efficiency and renewable energy technologies, education, training and information-sharing programmes, increased diversification of energy sources; reduction of greenhouse gas emissions and enhancement of carbon sinks from forests, agriculture, grazing and other lands. Forms of co-operation could include:

- designation of a government office for Bolivia, with the responsibility for project evaluation and issuance of official statements of project acceptance;
- design of Bolivia's programme criteria to facilitate acceptance of joint implementation projects consistent with the ground rules for the USIJI and Bolivia's domestic priorities for measures to reduce greenhouse gas emissions and increase carbon sinks;
- identification and support of projects that are likely to meet the criteria for joint implementation pilot programmes established by the participants;
- exchange of information on methodologies and mechanisms to establish procedures for monitoring and external verification of greenhouse gas reductions, and the tracking and attribution of such reductions, consistent with the criteria for project selection in established national joint implementation pilot programmes and applicable Bolivian law;
- outreach and promotion of joint implementation and other sustainable development activities in the private, public and non-governmental sector, including dissemination of information about the national criteria of the participants for joint implementation projects, and availability of supporting technical assistance resources;
- support of the international pilot phase for joint implementation at an international forum, including at the Conferences of the Parties to the United Nations Framework Convention on Climate Change and meetings of the Conference's subsidiary bodies; and
- exploration of credible certification of emissions reductions, including the determination of reasonable greenhouse gas emissions baselines at the project level.

RECEIVED

HUNTON & WILLIAMS

ATLANTA, GEORGIA
BANGKOK, THAILAND
BRUSSELS, BELGIUM
CHARLOTTE, NORTH CAROLINA
HONG KONG, CHINA
KNOXVILLE, TENNESSEE

P. O. BOX 109
RALEIGH, NORTH CAROLINA 27602
TELEPHONE (919) 899-3000
FACSIMILE (919) 833-6352
(919) 899-3096

MCLEAN, VIRGINIA
NEW YORK, NEW YORK
NORFOLK, VIRGINIA
RICHMOND, VIRGINIA
WARSAW, POLAND
WASHINGTON, D.C.

CHARLES D. CASE
INTERNET MAIL: ccase@hunton.com

FILE NO.: 34085.5
DIRECT DIAL: (919) 899-3045

1999 APR 30 A 10:37
DEPT. OF ENERGY
FOIA

FOIA #990430000 03

April 26, 1999

"COMMERCIAL" SEARCH, REVIEW & REPRODUCTION

Mr. Abel Lopez
Supervisor- Office of Freedom of Information and Privacy Act
Department of Energy
1000 Independence Avenue S.W.
Washington, D.C. 20585

APR 30 1999 03

Dear Mr. Lopez:

This is a request for all documents from 1997 to the present submitted by John Palmisano related to ENRON and global climate change or emissions trading pursuant to the Freedom of Information Act, 5 U.S.C. § 552 (the "Act"), and the provisions of 40 C.F.R. Part 2. I request that you make a copy of each of the requested documents available to me at the following address:

Hunton & Williams
1900 K Street, N.W.
P. O. Box 19230
Washington, D.C. 20036

This request is for the following documents:

(1) any and all documents from 1997 to the present submitted by John Palmisano related to ENRON and global climate change; and

(2) any and all documents from 1997 to the present submitted by John Palmisano related to ENRON and emissions trading.

If the Department of Energy hereinafter ("DOE"), withholds any document or record responsive to this request, I ask that DOE identify the document, the names and positions of its author(s) and recipients(s), the correct date, the number of pages, the exemption upon which DOE relies for refusing to release the document or record, a detailed explanation of why the Department believes the exemption is applicable, and a detailed explanation of why the public interest would best be served by withholding the document.

Pursuant to 40 C.F.R. § 2.120, Hunton & Williams will pay any reasonable and appropriate charges incurred for search and copying costs. Please send me an invoice along with

the copies of the documents that I have requested. I need no prior notice of the amount of the incurred costs unless they exceed $100. If the estimated costs are anticipated to exceed $100, please contact me promptly before proceeding with the response to this request.

Pursuant to 40 C.F.R. § 2.112, I request a response from DOE within 10 days (excepting Saturdays, Sundays, and federal holidays) after receipt of this request. If an extension of the 10 day period is requested by the relevant DOE office, I request written notification explaining the reasons for the extension pursuant to 40 C.F.R. § 2.112(e). If there are any questions relating to this request please contact Britt Waldon at 202.955.1681 or me at the letterhead address.

Very truly yours,

Charles D. Case

cc: Britt A. Waldon

Department of Energy
Washington, DC 20585

May 5, 1999

Charles D. Case
Hunton & Williams
1900 K Street, NW
P.O. Box 19230
Washington, DC 20036

Attn: Britt A. Waldon
Re: 9904300003

Dear Mr. Case:

This is in response to the request for information that you made to the Department of Energy (DOE) under the Freedom of Information Act (FOIA), 5 U.S.C. 552. You asked for all documents from 1997 to the present submitted by John Palmisano related to ENRON and global climate change and emissions trading.

Your request has been assigned to the Office of Energy Efficiency to conduct a search of its files and to provide you with a response. If you need further assistance, please contact Robbie Dooms EE-62, in the Office of Energy Efficiency, at the Department of Energy, 1000 Independence Avenue, SW, Washington, DC 20585 or on (202) 586-9332.

Your letter stated that you agree to pay up to $100.00 for search and copying costs incurred to process this request and would like to be notified if fees will exceed the amount that you have stipulated. For purposes of assessment of fees, you have been categorized under the Department's regulation implementing the FOIA at Title 10, Code of Federal Regulations (CFR), Section 1004.9(b)(1), as a "commercial use" requester. In this category, you will be charged for search, review and duplication costs associated with the request. The Office of Energy Efficiency will inform you if fees are expected to exceed your stipulated amount.

A search also was conducted of the files of the Office of Executive Secretariat, which controls all incoming correspondence addressed to the Secretary and Deputy Secretary of Energy. The search found no documents responsive to the request. Therefore,

Printed with soy ink on recycled paper

pursuant to 10 CFR 1004.4(d), I am unable to provide any documents responsive to your request from this office.

Pursuant to 10 CFR 1004.7(b)(2), I am the individual responsible for the determination of the Office of the Executive Secretariat.

You may challenge the adequacy of this search for responsive documents by submitting a written appeal to the Director, Office of Hearings and Appeals, U.S. DOE, 1000 Independence Avenue, SW, Washington, DC 20585-0107, within 30 calendar days of receipt of this determination. The written appeal, including the envelope, must clearly indicate that a Freedom of Information Act appeal is being made. The appeal must contain all the elements required by 10 CFR 1004.8 to the extent applicable. Judicial review will thereafter be available to you (1) in the District of Columbia; (2) in the district where you reside; (3) where you have your principal place of business; or (4) where the DOE records are located.

If you have any questions concerning this correspondence, please contact Chris Morris of my staff on (202) 586-3159. I appreciate the opportunity to assist you with this matter and thank you for your interest in the Department.

Sincerely,

Abel Lopez, Director
FOIA/Privacy Act Division
Office of the Executive Secretariat

United States Government Department of Energy

memorandum

DATE: May 5, 1999

REPLY TO ATTN OF: HR-73

SUBJECT: Freedom of Information Request 9904300003 Charles D. Case

TO: Kobbie Dooms EE-62

The attached Freedom of Information (FOI) request is being sent to you for action as responsive records appear to be within your organization. If your organization does not have jurisdiction over the responsive records, please inform me as to whom you are forwarding the request.

If other divisions, offices or field organizations also have relevant records, you are responsible for requesting their participation and for coordinating the response. It is important that an appropriate response be forwarded to the requester within 10 working days as failure to respond can be deemed a denial.

On the reverse side of this memorandum, a "Reminder of Procedures for Handling FOI Requests" should assist your staff. If you have any questions, please contact me on (202) 586-3159.

PLEASE ENSURE THAT THE DOCUMENTS YOU LOCATE ARE SPECIFICALLY RESPONSIVE TO THIS REQUEST, PARTICULARLY IF THEY ARE CLASSIFIED.

Thank you for your cooperation and assistance.

Alexander C. Morris
FOI and Privacy Acts Specialist
FOI and Privacy Acts Division

Attachment

1 of 2

Michael McCabe
05/31/2001 06:17 PM

To: Carolyn Wallace/EE/DOE@DOE
cc: Tania.Strong@EE.DOE.gov
Subject: Meeting for David Garman with Enron

Carolyn, would you call Hap Boyd (Enron) at (213) 452-5103 and set up a meeting for him on Tuesday, June 3 for approximately 30 minutes? David knows Hap. Hap would like to introduce the President of Enron Wind to David.

Michael

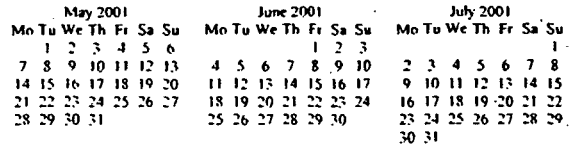
Calendar Entry:

Appointment

Subject:	Meeting with Hap Boyd(Enron) VP He will be bringing Adam Umanoff, Pres. of Enron, Bob Gates Senior VP POC: (213) 452-5103		Location:	
Begins:	Tue 06/05/2001	12:00 PM	Entry type:	Appointment
Ends:	Tue 06/05/2001	12:30 PM		
Chair:	David Garman/EE/DOE			

Pencil In	Time will appear free to others.
Mark Private	Others cannot see any details about this event.
Notify me	Have Notes notify you before the event.
Categorize:	

Description:



Tuesday, June 05, 2001

09:00 AM - 09:30 AM Daily Updates
Chair: David Garman

10:00 AM - 11:00 AM Program Director's Meeting (Secretary's Conference Room)
Chair: David Garman

11:00 AM - 11:45 AM FEMP 2001 Energy Workshop Subj: Pre Brief POC: Joan Glickman X65607
Chair: David Garman

12:00 PM - 12:30 PM
Meeting with Hap Boyd(Enron) VP He will be bringing Adam Umanoff, Pres. of Enron, Bob Gates Senior VP POC: (213)

12:30 PM Program Directors Meeting

01:00 PM - 01:30 PM Geneva Keys

01:30 PM - 02:30 PM
Meeting with David Bradley - National Community Action Foundation (NCAF) Subj: President's Weatherization Budget
POC:842-2092
Chair: David Garman

02:30 PM - 03:30 PM ALL HANDS MEETING
Chair: David Garman

22

David Garman

01/28/2002 12:55 PM

To: Lee Otis@HQMAIL@HQDOE
cc: Kyle.McSlarrow@hq.doe.gov@HQDOE, (bcc: Karen Kimball/EE/DOE)
Subject: Disclosure of Enron "contact"

Lee,

On Thursday, October 4th I took a "day trip" to Houston for some "Rebuild America" events. During the course of the day, I also toured Enron's new energy efficient building and met with some Enron officials. Here is a brief outline of how the day unfolded, who I met with, and what was discussed:

At 9:30 a.m., I visited the Fifth Ward Community Redevelopment Corporation. Houston's Fifth Ward is a predominantly African American, low income community. The Fifth Ward Community Redevelopment Corporation assists community members with credit and mortgage counseling to assist them in achieving home ownership. Our "Rebuild America" program has been working with the Fifth Ward Community Redevelopment Corporation through the Texas State Energy Office and the City of Houston to ensure that new affordable housing built in the community is as energy efficient as possible, recognizing that low income Americans spend a disproportionately large share of their income on energy. During this visit, I visited several new affordable housing properties that were integrating our energy saving technologies, and met the new and prospective home owners of these properties.

At 11:00 we went downtown and toured, pursuant to Enron's prior invitation, Enron's brand new (still under construction) building. This building is one of the most energy-efficient air conditioned commercial office buildings in the world. Energy saving equipment includes a high delta-T chilled water system, T-5 lighting, oversized chilled water pipes, and other features designed to yield a 37% reduction in electrical consumption (20 million KW hours/year in avoided load). After the tour, I had lunch with Dan Leff, the Chief Operating Officer of Enron Energy Services, Enron's retail energy management business. (This is an energy services company that capitalizes a client's energy efficiency improvements and then is repaid by sharing in the client's savings. They are also providing the energy management functions for their own new building.) We mainly talked about the opportunities to promote energy efficient design in Houston's low income communities. Enron seemed to be looking to do some local activities focused on disadvantaged neighborhoods in their own home town. I departed around 1:00. Other Enron officials at lunch included Robert Frank, a Director for Enron's Government Affairs Department, and Lisa Jacobson, a manager who advises Enron on Climate Change.

At 1:30 I participated in an event formally launching our Rebuild America partnership. The Mayor of Houston, Members of the City Council, the Texas State Energy Office, local utilities (including Reliant and Enron), homebuilders, and community members participated in this event. The event was covered by local radio and TV media.

After this event ended I returned to Washington.

I can provide more information if needed. Let me know.

David

Rebuild America Partnership Launch
October 4, 2001 -- Houston, Texas

Thank you Mayor Brown for those kind words of introduction and that warm welcome.

It is great to be in Houston – the "Energy Capital of the World" to celebrate the launch of our 387th Rebuild America partnership... the **largest** Rebuild America Partnership in the nation.

I want to commend Mayor Lee Brown for his forward thinking approach to revitalizing Houston's neighborhoods through the "Super Neighborhoods" Program.

America's energy future is being built neighborhood by neighborhood, community by community.

When we choose clean and efficient technologies, we create jobs, promote local economic growth, and improve the air quality and the health of citizens here in Houston and in communities across America.

But what is really remarkable about the Rebuild America approach is the spirit of partnership it depends on.

This partnership is not "powered" by Washington. We provide assistance... but we aren't the ones who really make it happen.

This partnership also didn't happen solely because of the Mayor ... although it sure couldn't happen without him.

Community leaders, businesses, state and local government leaders, and citizens all power this partnership.

Today we are here to recognize all of you and celebrate your participation.

In addition to the mayor, I want to join in thanking and recognizing:

- State and local government leaders:

24.

- State Senator Buster Brown, author and champion of Senate Bill 5 – the Texas Emissions Reduction Plan – one of the most comprehensive pieces of energy and environment legislation in the country.

- Dub Taylor, Director of the State Energy Conservation Office. Dub's office is a major conduit for DOE's energy efficiency programs and funding. In Texas, DOE works with Dub and Texas A&M University's Energy Systems Laboratory to provide support to Texas cities and communities as they work to realize the benefits of energy efficiency and renewable energy.

- Members of the business community:

  - Sharon Michael-Owen, Reliant Energy;
  - Steve Von Hofe, Newmark Homes; and
  - Dan Leff, Enron Energy Corporation.

  As we have just heard, each of these corporate citizens is committed to making Houston a more livable community by promoting energy efficiency technologies.

- The Houston Independent School District. We look forward to working with the Houston Independent School District to help reduce their operating costs and save money through our EnergySmart Schools campaign.

- Stephan Fairfield of the Fifth Ward Community Redevelopment Corporation, a nationally recognized model for rebuilding a healthy community through affordable housing development and economic revitalization.

And I would also like to thank all of you who have joined us here today for your commitment to improving the quality of life for all the citizens of Houston.

This morning, I was given the opportunity to see firsthand some of the innovative energy initiatives already occurring in Houston.

For example, the on-going renaissance of the historic Fifth Ward community. As we've just heard, Newmark Homes has agreed to partner with the Fifth Ward Community Redevelopment Corporation, to build more energy efficient homes.

This is a great example of a for-profit company providing "best practices" guidance, as well as economic and product expertise, to a non-profit community redevelopment corporation.

As a result, families living in these homes will be warmer in the winter, cooler in the summer, while paying less for their utility bills.

I also had the opportunity to tour Enron's new corporate headquarters building – a state of the art energy efficient building. As an ENERGY STAR building, it is in the top 25 percent of similar buildings nationwide for energy performance. This building offers an opportunity to influence the current construction boom in downtown Houston by demonstrating the benefits of an energy efficiency design.

You know, our homes, offices, schools, churches, and municipal buildings account for 36 percent of energy use in the United States, and Americans spend more than $240 billion each year on energy to heat and cool our buildings.

In the residential context, dollars that are not sent out of the local community for gas and electric bills tend to stay in the community. So Rebuild America is not just about saving energy... it's about empowering communities!

Since it began in 1995, Rebuild America partnerships have made energy-efficiency improvements to over 300 million square feet of floor space and are saving $94 million annually. That's enough to power 100,000 homes for a year. Our goal is to achieve annual energy savings of $1.2 billion by 2010!

There are now 387 Rebuild America partnerships, in 53 states and territories, working to improve their communities, by saving energy and dollars.

Today, Houston joins over 40 existing Texas Rebuild America partnerships encompassing cities, counties, school districts and public housing agencies. To date, these partnerships have renovated over 10 million square feet, and realized nearly $3.5 million annual energy savings.

Texans are an important part of a larger national undertaking – the restoration of our nation's energy vitality and the protection of the environment.

Fortunately, we have a roadmap – the President's National Energy Policy released last May.

The President's energy plan prominently features the importance of energy efficiency and renewable energy in our nation's future.

More than half of the Plan's 105 recommendations – 54 of them to be exact – pertain to the importance of improving this nation's energy efficiency and expanding our use of clean, renewable energy sources.

The restoration of America's energy vitality and the protection of our environment is not an either/or proposition. We have no choice but to do both.

An as important as saving energy was prior to September 11, consider how much more important it is today.

It is clear that our reliance on imported oil—56% of the oil we use—has complicated our response to the terrorist attack.

There is also little doubt that some of the dollars we have exported in exchange for foreign oil have found their way into the hands of terrorists and would-be terrorists.

The last time I checked, we were importing over 600,000 barrels of oil each day from Iraq.

Given the impact of these attacks on our economy, it also makes since to keep our dollars working here at home rather exporting them overseas to pay for oil.

Every person here today has a role to play in helping us to reduce our energy use, and nobody's contribution is insignificant.

I'm reminded of the story of the janitor who was sweeping the floor of a NASA building late one afternoon in the 1960's.

When asked what he was doing, he stopped his sweeping and gazed at his questioner, somewhat incredulous at the question.

Answering directly and simply, he said: "I'm helping to put a man on the moon."

He was right. While he may have just been sweeping the floor, his view of the "big picture" was crystal clear.

Our "big picture" is a world free from the reach of global terrorism... greater energy security ... a cleaner environment... healthier communities ... and a stronger economy.

Only as partners will we achieve our "big picture" aspirations.

In that spirit, it is now my pleasure to present to Mayor Brown and the City of Houston the Rebuild America Partnership Plaque commemorating today's formal launch of the City of Houston/Rebuild America Partnership.

Itinerary
David Garman
G-8 Energy Ministerial
Detroit, Michigan
&
Desert Sky Wind Turbine Dedication
Iraan, Texas
May 2-3, 2002

Thursday, May 2, 2002

Flight- Washington to Detroit Metro, MI (DTW)

7:00am	Depart	Washington Reagan, DC (DCA) United Airlines, UA Flight #7549
8:55am	Arrive	Detroit, MI (DTW)

Ground Transportation from DTW:
TBD

10:00am	Arrive	Detroit Marriott Renaissance Center- Michel Angelo Room 4th Floor
11:30am	Travel to Airport	
1:13pm	Depart	Detroit, Mi (DTW) American Airlines, AA Flight #1663
3:06pm	Arrive	Dallas Fort Worth, (DFW)
4:11pm	Depart	DFW American Airlines, AA Flight #3629 (American Eagle)
5:35pm	Arrive	Midland, Odessa, TX (MAF)

Ground Transportation:
Provided by Paul Loeffelman. He will be accompanied by Ward Marshall and Tom Holliday. Dinner.

Overnight Accommodations:
Hilton Midland (~ 15 miles from MAF)

Confirmation # 3142620234

Friday, May 3, 2002

10:00am	Travel to Iraan. Approximately 90 miles (travel time 1½ hours)
11:30am	Arrive at Iraan. Barbecue starts.
12:30pm	Ceremony starts (see attached agenda).
1:00pm	Speaker presentations (David Garman will speak around 1:35 for ~10 min)
1:45pm	Closing Remarks
2:00pm	Travel to MAF

Flight- Midland/Odessa- Washington

4:35pm	Depart	Midland/Odessa, TX (MAF) American Airlines, AA Flight #3908
6:05pm	Arrive	Dallas Fort Worth, TX (DFW)
7:11pm	Depart	Dallas Fort Worth, TX (DFW) American Airlines, AA Flight #0608
11:04pm	Arrive	Washington Dulles, DC (IAD)

WELCOME!

...to the Desert Sky Wind Farm Dedication Ceremony.

May 3, 2002
Desert Sky Wind Farm Project Site

Desert Sky

Wind Farm
Pecos County, Texas

Honoring those involved in bringing 160.5 megawatts of clean, renewable wind power to Texas!

24.

Dedication Ceremony - Desert Sky Wind Farm

AGENDA – MAY 3, 2002

Welcome ——— Ward Marshall, Master of Ceremonies
Director, Business Development, American Electric Power

Invocation ——— Pastor Jerry Fortune

Posting of Colors ——— Sheffield Boot Camp Color Guard *(please stand)*

National Anthem ——— Alamo Elementary School (Mrs. Casas and Mrs. Delano's third grade classes) *(please stand)*

Special Awards ——— Rick Perry, Governor of Texas
Dr. Linn Draper, CEO, American Electric Power
Milton Lee, CEO, City Public Service of San Antonio
Bob Gates, Senior Vice President, Enron Wind

Brief Remarks ——— Delmon Hodges, Pecos County Judge
Frank Madla, State Senator
Pete Gallego, State Representative
Dr. Linn Draper, CEO, American Electric Power
Milton Lee, CEO, City Public Service of San Antonio
Bob Gates, Senior Vice President, Enron Wind

Keynote Address ——— Rick Perry, Governor of Texas

Special Address ——— David Garman, Assistant Secretary, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy

Desert Sky Dedication ——— Rick Perry, Governor of Texas
Dr. Linn Draper, CEO, American Electric Power
Milton Lee, CEO, City Public Service of San Antonio
Bob Gates, Senior Vice President, Enron Wind

Speaker/Company Bios:

American Electric Power (project owner)
American Electric Power (AEP) is a multinational energy company with a balanced portfolio of energy assets. AEP, the United States' largest electricity generator, owns and operates more than 42,000 megawatts of generating capacity in Texas, 11 other states and select international markets.

City Public Service of San Antonio (project power purchaser)
City Public Service is one of the nation's largest municipal utilities and serves more than 560,000 electric customers throughout its 1,566 square mile service area, and about 302,000 natural gas customers in the urban San Antonio area. CPS's involvement with wind power demonstrates the company's commitment towards protecting the environment and providing alternative energy choices to its customers. Currently, CPS has the highest percentages of renewables in the state with wind energy capacity representing 4.15% of the utility's electric load.

Enron Wind (project developer, builder and operator)
Enron Wind is the world's only fully integrated wind power company, providing a full range of wind power capabilities, including wind turbine manufacturing, operations, construction and pre-development services. Over the past two decades the company has developed and/or sold and installed more than 5,500 wind turbines comprising 2,500 megawatts of capacity around the globe. Enron Wind is currently in the process of being acquired by GE Power Systems; a May 2002 transaction close is anticipated.

Ward Marshall
Ward Marshall is AEP's Energy Services' director of business development. He also is the 2002 incoming president of the American Wind Energy Association.

Jerry Fortune
Pastor of the Mother Holmes Baptist Church in Sheffield.

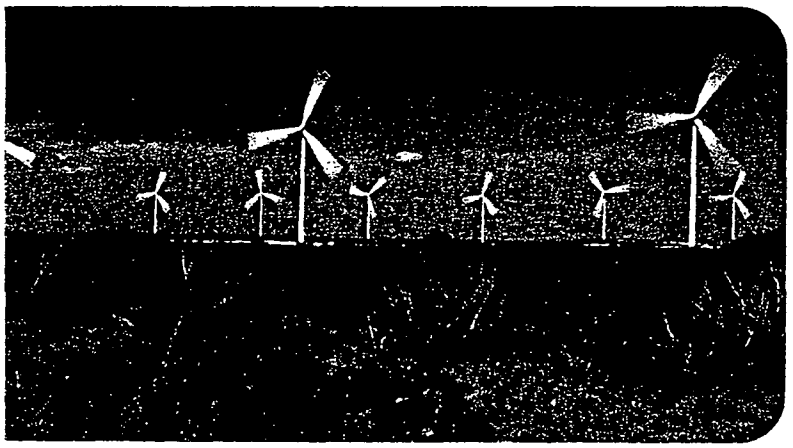
Sheffield Boot Camp Color Guard
The Sheffield Boot Camp Color Guard is part of a state-run boot camp of the Texas Youth Commission, located in Sheffield, Texas. The Sheffield Boot Camp program is led by Commandant William Roach and focuses on improving each cadet through leadership skills, physical training and family development.

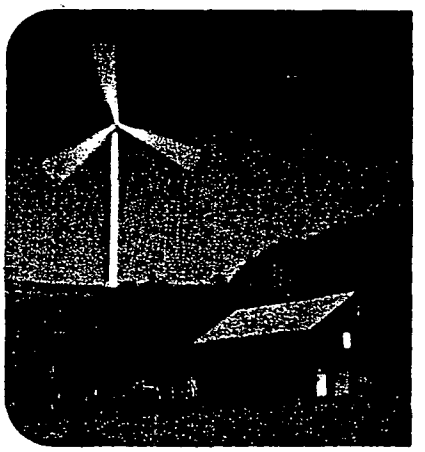
Alamo Elementary School Third-Graders
Alamo Elementary School is located in Ft. Stockton. Its students are among over 1,200 community students who learned about wind energy this week in the celebration of the Desert Sky Wind Farm Dedication.

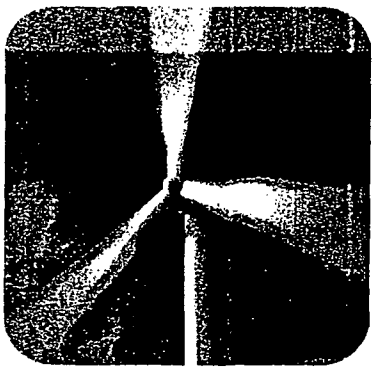
Rick Perry, Governor of Texas
Rick Perry was sworn in as the state's 47th Governor on December 21, 2000. A fifth generation Texan, Governor Perry is a native of Paint Creek, Texas and served as Lieutenant Governor from 1999 to 2000. Prior to being elected Lieutenant Governor, Perry served two terms as Texas Commissioner of Agriculture, and was a member of the Texas House of Representatives. Governor Perry graduated from Texas A&M University, where he was a member of the Corps of Cadets, and served in the United States Air Force, flying C-130 tactical airlift aircraft in the U.S., Europe and the Middle East.

Dr. Linn Draper
Dr. Linn Draper, Jr. is chairman, president and chief executive officer of American Electric Power. A Texas native and graduate of Rice University, Dr. Draper became president of AEP in March 1992 following 13 years with Gulf States Utilities Company in Beaumont, Texas, where he served as chairman, president and CEO. He became chairman, president and CEO of AEP in May 1993.

1.5MW Series



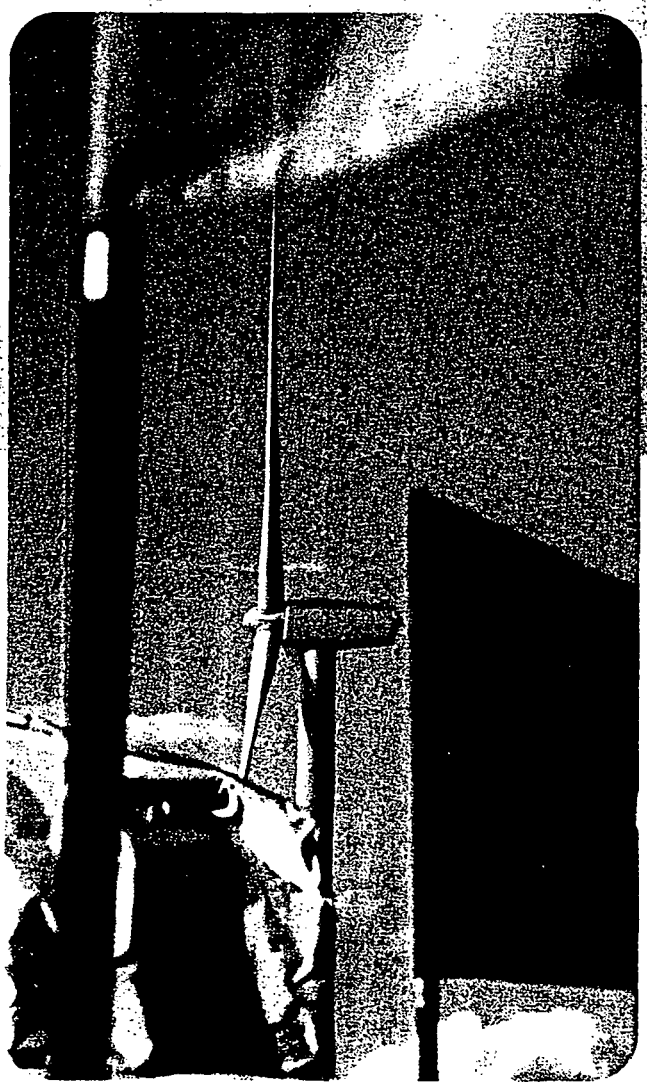


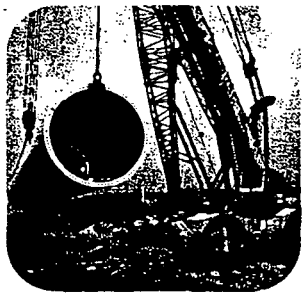


The Enron Wind 1.5 MW series wind turbine.

EnronWind

The Enron Wind 1.5 MW series wind turbine.



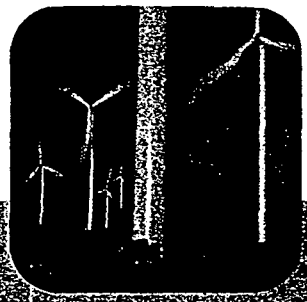


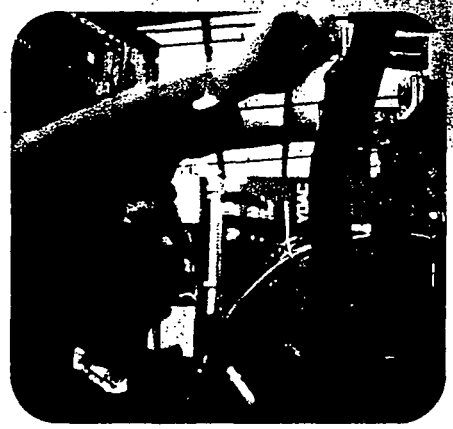
With advanced wind turbines ranging from 600 kW to 1.5 MW, Enron Wind provides customized solutions for today's challenging land based and offshore requirements. Enron Wind technology features a patented power conversion system for reliable, cost effective operation, and offers its patented dynamic VAR control for local grid support and improved transmission efficiencies. Enron Wind's ISO 9001 Quality Systems certified manufacturing facilities are located in California, Germany and Spain.

The Enron Wind 1.5 MW series wind turbine.

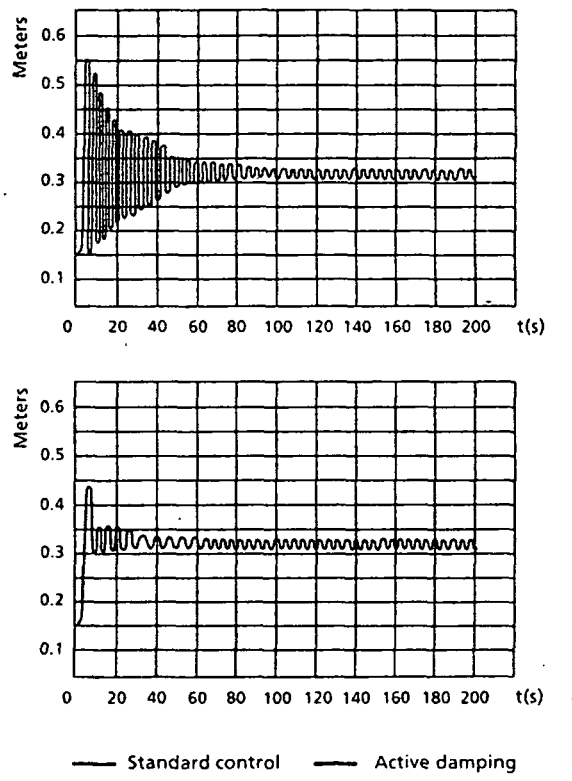
When it comes to "mega" technology, our proven 1.5 MW wind turbine was the first of its size class to become commercially available. Today, our customers find that the Enron Wind 1.5 MW Series wind turbines combine proven technology and an extremely low cost of energy (COE), with quiet, reliable operation. The Enron Wind 1.5 MW Series wind turbines are also versatile. Their universally operable nacelle accepts rotor diameters of 65 meters, 70.5 meters, and 77 meters. And their variable hub heights range from 65 meters to 80 meters.

The Enron Wind 1.5 MW Series wind turbines are active yaw and pitch regulated machines with power/torque





TOWER OSCILLATIONS: ACTIVE DAMPING VS. STANDARD CONTROL



Enron Wind's patented power conversion system provides active damping of the entire wind turbine system. Benefits include considerably less tower oscillation as compared to constant speed wind turbines, greater drivetrain reliability, reduced maintenance cost and longer turbine life.

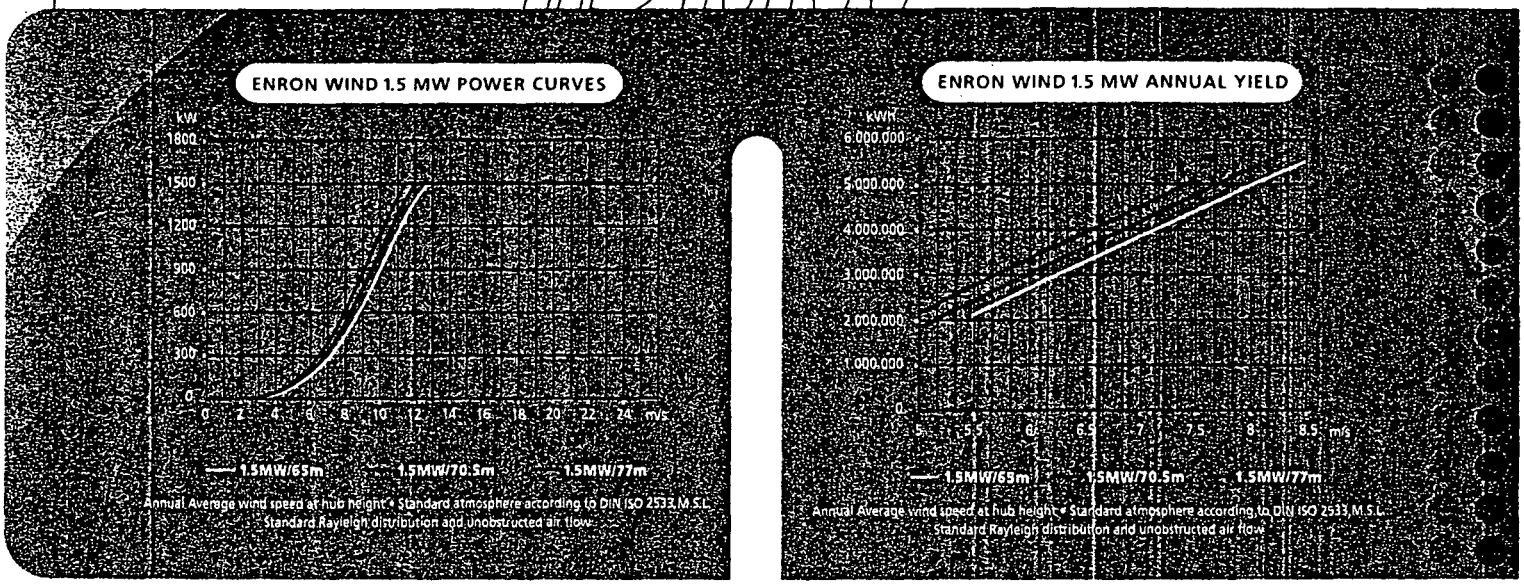
control capability. The rotor utilizes blade pitch regulation and variable speed operation to achieve optimum power output. The 1.5 MW Series wind turbines also feature a bedplate drivetrain design where all nacelle components are joined on a common structure. The nacelle is lined with sound insulating foam and the generator and gearbox are supported by elastomeric elements to assure that the Enron Wind 1.5 MW is the quietest machine available in its size class on the market today. The Enron Wind 1.5 MW Series technology is designed in accordance with the International Electrotechnical Committee 1400-1 Standard and Germanisher Lloyd's Rules and Regulations for wind turbine design.

Enron Wind offers ISO 9001 Quality Systems Certified manufacturing, experienced power plant design and engineering, development expertise, creative financing options, experienced operations and maintenance, and responsive and reliable customer service. Its wind technology has been utilized in world-class projects around the globe, including three of the world's largest wind power projects.

At Enron Wind, our team is committed to deliver continuously superior products and services to you, our customers, over the long term.

ENRON WIND TECHNOLOGY.

The Enron Wind 1.5 MW series wind turbine.



Superior technology for maximum energy capture.

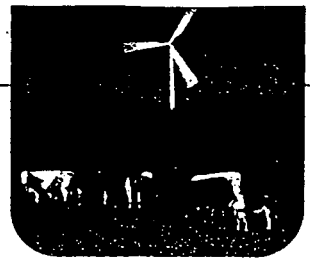
At the heart of the Enron Wind technology is a patented power conversion system which converts the wind turbine's variable speed operation into constant frequency power required by the utility. The results are remarkably higher energy yield and high quality power that is fully compliant with IEEE-519 power quality requirements.

Higher energy capture and reduced loads.

Through its advanced electronics, the Enron Wind turbine's control system continually adjusts its blades' rpm level to enable it to achieve optimum lift at each wind speed. This "variable speed" operation maximizes the turbine's ability to remain at the highest level of aerodynamic efficiency. In contrast, fixed speed wind turbines only attain peak efficiency at one wind speed. The result – greater annual power production yield as compared to constant speed operation. Additionally, while constant speed rotors must be designed to deflect high wind gust loads, Enron Wind's variable speed operation enables the loads from the gust to be absorbed and converted to electric power. Generator torque is controlled through the frequency converter. This control strategy allows variable rotor speed operation in strong, gusty winds, thereby reducing torque loads in the drivetrain. The Enron Wind variable speed wind turbine converts the extra energy in wind gusts to electric power. Enron

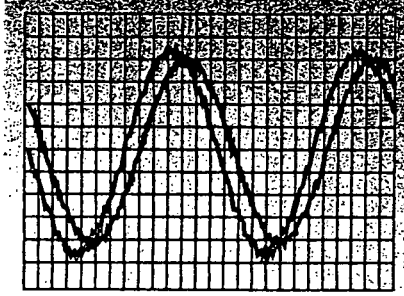
Wind's operating speed range is notably higher than the "slip" range utilized by other available technologies which produce heat rather than electric power.

Enron Wind's variable speed system also provides active damping of the entire wind turbine system, resulting in considerably less tower oscillation when compared to constant speed wind turbines. Active damping of the machine also limits peak torque, providing greater drivetrain reliability, reduced maintenance cost, and longer turbine life.



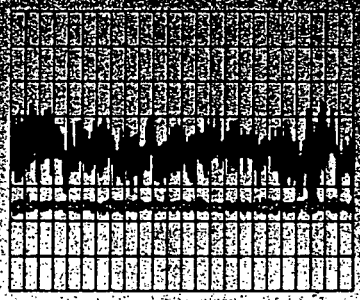
Reactive power control and voltage support.
Maximum energy capture.
Superior power quality.
Reduced loads.

DYNAMIC VAR CONTROL TECHNOLOGY: LEADING, LAGGING OR UNITY POWER FACTOR



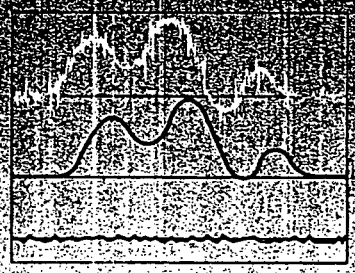
Enron Wind's patented dynamic power conversion system with VAR control technology enables the wind turbine to generate reactive power (current leading voltage - shown above), providing transmission efficiencies and enhanced voltage stability, which is particularly beneficial in weak grid applications.

TORQUE: VARIABLE VS. CONSTANT SPEED

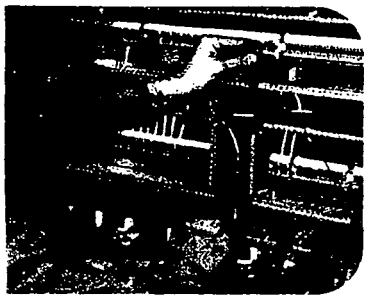


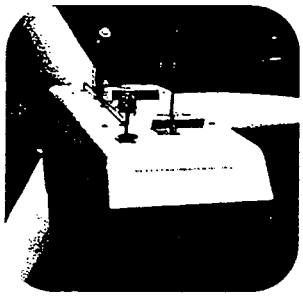
Enron Wind's variable speed operation provides reduced mean torque loads and smaller torque excursions for a given power output compared to constant speed wind turbines.

ENERGY STORAGE IN THE ROTOR



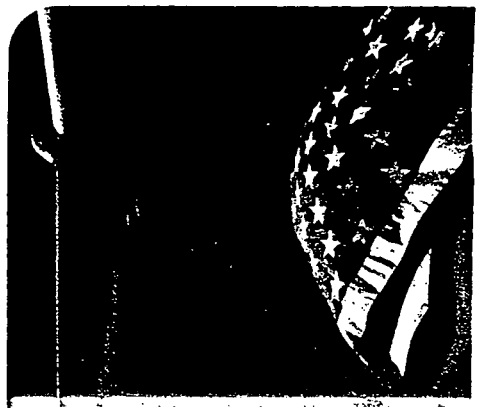
The energy of a gust is stored by accelerating the rotor. This leads to reduced loads, improved transmission efficiencies and performance.



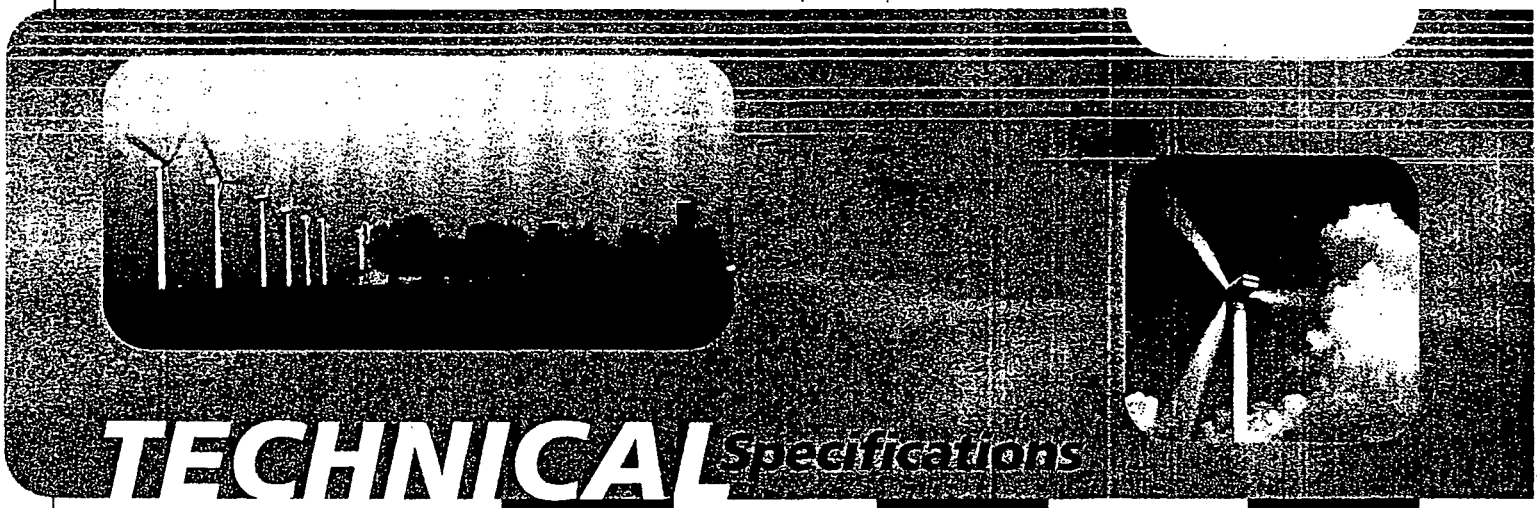


Dynamic reactive power and voltage support.

Enron Wind's patented dynamic power conversion system with optional VAR control provides support and control to local grid voltage, improving transmission efficiencies and providing the utility grid with reactive power (VARs) to increase stability. Enron Wind technology, outfitted with its patented power conversion system and patented VAR control option, automatically maintains defined grid voltage levels and power quality. This feature is particularly beneficial with weaker grids or larger turbine installations.



The Enron Wind 1.5 MW series wind turbine.



TECHNICAL Specifications

	65 m rotor	70.5 m rotor	77 m rotor
Performance			
Cut-in wind speed	4.0 m/s	3.0 m/s	3.0 m/s
Cut-out wind speed	25 m/s	25 m/s	20 m/s
Rated wind speed	13 m/s	12 m/s	11.8 m/s
Rotor			
Number of blades	3	3	3
Diameter	65 m	70.5 m	77 m
Swept area	3318 m2	3904 m2	4657 m2
Rotor speed (variable)	11-20 rpm	11-20 rpm	10-18 rpm
Maximum tip speed	68 m/s	73.8 m/s	72.6 m/s
Blade Length	31.2 m	34.0 m	37.2 m

Gearbox
Type: Three step planetary spur gear system

Generator
Type: Doubly-fed, asynchronous
Rated power: 1,500 kW

Inverter
Type: IGBT-frequency inverter

Braking systems
Individual pitch regulation
Brake control system: fail-safe

Yaw system
Motor driven with wind direction
sensor and automatic cable unwind

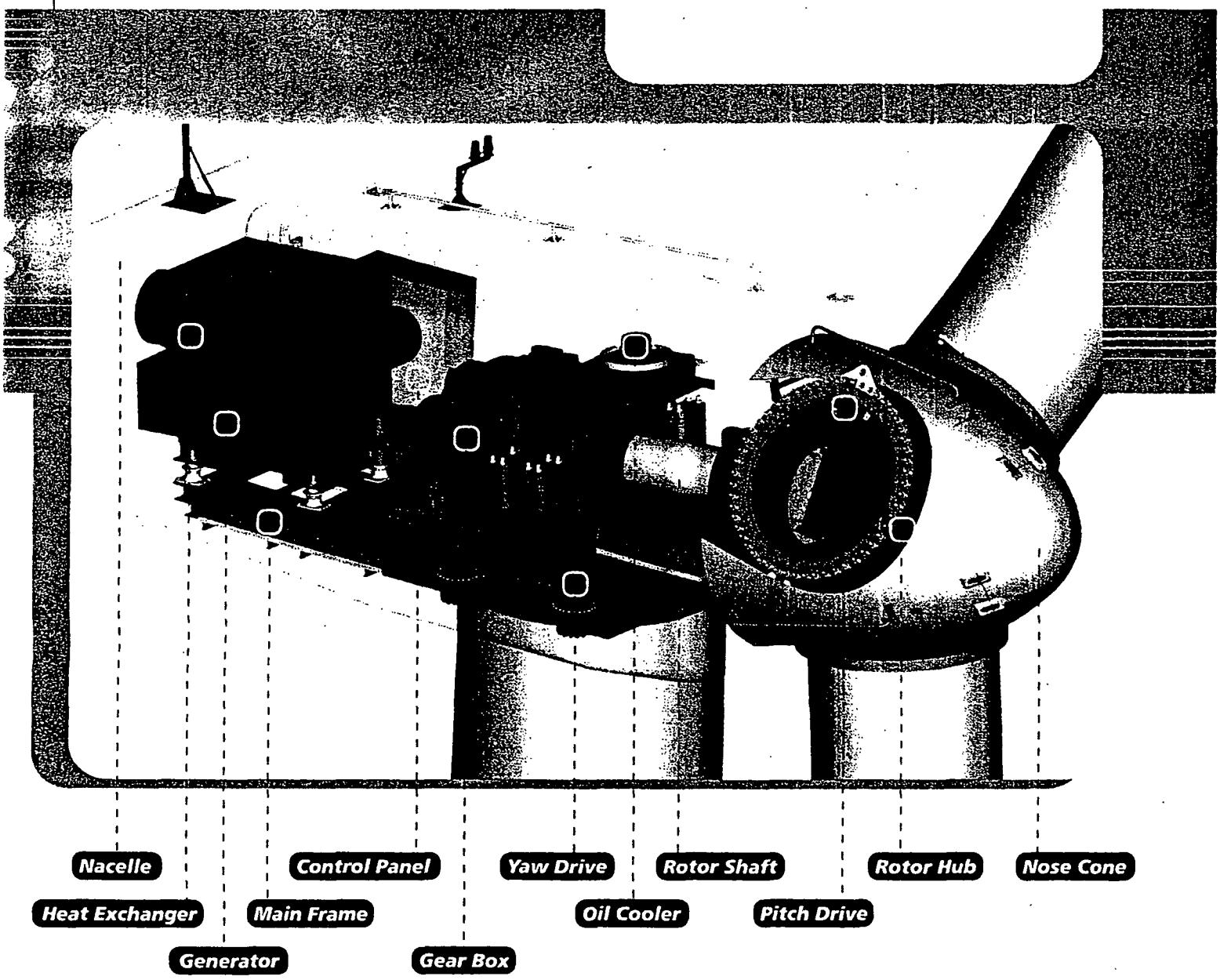
Control system
Microprocessor-based programmable logic controller (PLC)
Remote control operating system

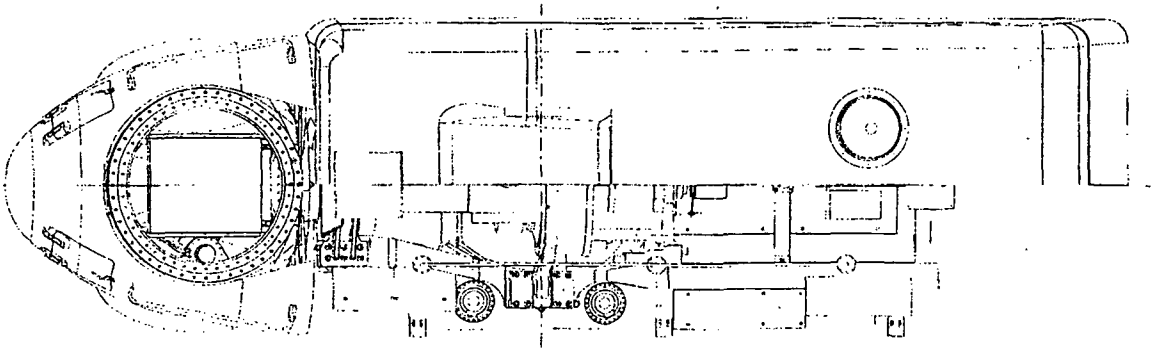
Tower
Multi layer coated, conical tubular steel tower with
interior safety ladder to the nacelle
Optional lifting system, 250 kg load capacity

Tower heights
Available from 65 to 100 meters

Lightning protection system
Lightning receptor installed on blade tips conducts energy
inside the rotor blades and down the tower

Sound proofing
Structure borne noise insulation of the drivetrain
Sound reduced gearbox
Reduced blade tip speed
Noise reduced nacelle


Nacelle
Heat Exchanger
Generator
Main Frame
Control Panel
Gear Box
Yaw Drive
Oil Cooler
Rotor Shaft
Pitch Drive
Rotor Hub
Nose Cone



Enron Wind is a leader in providing cleaner energy sources worldwide. We know that wind power will be an integral part of the world energy mix in this century, and we are committed to helping our partners and customers design and implement energy solutions for their unique energy needs. Every relationship we pursue bears our uncompromising commitment to quality and innovation.

For more information, please contact us.

Enron Wind

U.S.A.
13000 Jameson Road
Tehachapi, CA 93561
T. (+1) 661 823 6700
F. (+1) 661 822 7880
Email: wind@enron.com

Germany
Holsterfeld 5a
48499 Salzbergen
T. (+49) (0) 5971 980 0
F. (+49) (0) 5971 980 1090
Email: enron.wind@enron.com

Spain
Maria de Molina, 40, 4th floor
28006 Madrid
T. (+34) 91 782 81 00
F. (+34) 91 782 81 90
Email: enron.wind.spain@enron.com

Denmark
Niels Jerner Vej 10
9220 Aalborg
T. (+45) 96 35 42 07
F. (+45) 96 35 42 06
Email: enron.wind.denmark@enron.com

Sweden
Birger Jarlsgatan 14
11434 Stockholm
T. (+46) 8 54 50 36 30
F. (+46) 8 54 50 36 49
Email: enron.wind.sweden@enron.com

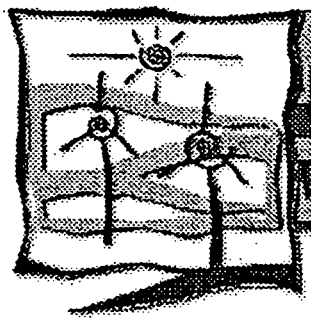
Greece
1 Tegeas & Aeroporias Street
16452 Athens Argyroupolis
T. (+30) 1 99 65 110
F. (+30) 1 99 68 574
Email: enron.wind.greece@enron.com

Great Britain
Prince Consort House, 27–29 Albert
Embankment SE1 7TJ London
T. (+44) 20 77 93 28 00
F. (+44) 20 78 20 34 01
Email: enron.wind.uk@enron.com

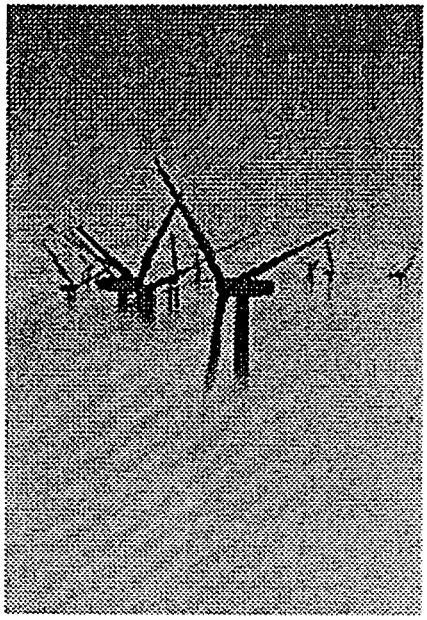
India
210, Keshava
2nd Floor, Bandra-Kurla Complex, Bandra (E)
Mumbai - 400051
T. (+91) 22 65 40 797
F. (+91) 22 65 40 800
Email: tacke@vsnl.com

Visit our website at: www.enronwind.com

France
21, Avenue Georges Pompidou
Immeuble Danica B
69486 Lyon Part Dieu - Cedex 3, France
T. (+33) 4 72 91 31 47
F. (+33) 4 72 91 31 48



Desert Sky Wind Project



PROJECT DETAILS

Technical Information

- Enron Wind 1.5 turbines
- 107 wind turbines, rated 1.5 megawatts (150,000 kilowatts) each
- Height of tower: approx. 200 feet (equal to a 20-story building)
- Rotor assembly diameter (sweep of blades): 231 feet (greater than the wingspan of a Boeing 747-400)
- Total height (tower and blades): 328 feet (taller than the Statue of Liberty)
- Length of each blade: 112 feet
- Weight of nacelle (module that houses generator at top of tower): 112,432 lbs. (56.2 tons)
- Operates in wind speeds 8-56 mph
- Operates at 11-20 revolutions per minute (one revolution every 2-3 seconds)
- Each turbine includes onboard weather station
- Automatic "yaw" control keeps turbine facing into wind
- Automatic blade pitch control keeps machines operating at optimum efficiency
- Weight of rotor assembly: 72,530 lbs. (36.3 tons)
- Weight of entire turbine: 326,654 lbs. (163.3 tons)
- Concrete foundations designed specifically for this turbine and this soil
- Concrete foundations 14 feet in diameter, 15 feet deep
- Tower in three sections, including base which contains electrical cabinets; access to top is inside tower
- All power collection circuits on the mesa are underground
- Collection substation at mesa's edge

- 69KV and 138KV lines carry power from the wind farm into the Texas power network
- Project to produce enough power for 50,000 average American homes

Operations Information

American Electric Power (NYSE: AEP) owns the Desert Sky wind power generation facility. The plant represents about a $175 million investment.

American Electric Power is a multinational energy company based in Columbus, Ohio. AEP owns and operates more than 38,000 megawatts of generating capacity, making it America's largest generator of electricity. The company is also a leading wholesale energy marketer and trader, ranking second in North America in wholesale electricity and wholesale natural gas volume. AEP provides retail electricity to more than 7 million customers worldwide and has holdings in the U.S. and select international markets. Wholly-owned subsidiaries are involved in power engineering and construction services.

City Public Service of San Antonio is one of the nation's largest publicly owned energy systems, serving more than a half-million electric customers and more than 300,000 natural gas customers. Acquired by the City of San Antonio in 1942, CPS this year is observing its 60th anniversary of municipal ownership. Proceeds from CPS remain in San Antonio and account for approximately one-third of the City's annual operating budget for police and fire protection, street improvements, parks and other service.

Enron Wind, an affiliate of Enron Corp., is the manufacturer of the turbines used at the Desert Sky facility. Enron Wind also provides certain ongoing operations and maintenance functions at the site. The project uses 107 Enron Wind 1.5 MW turbines, the largest wind turbine manufactured in the United States. The project, completed in December 2001, was developed and constructed by Enron Wind, a fully-integrated wind power company which also supplied wind turbines to AEP's Trent Mesa Wind Project. The company manufactures wind turbines in North America, Germany and Spain.

(Note: In the past this wind project has been called both Indian Mesa and Clear Sky.)

Copyright AEP 2002 All rights reserved

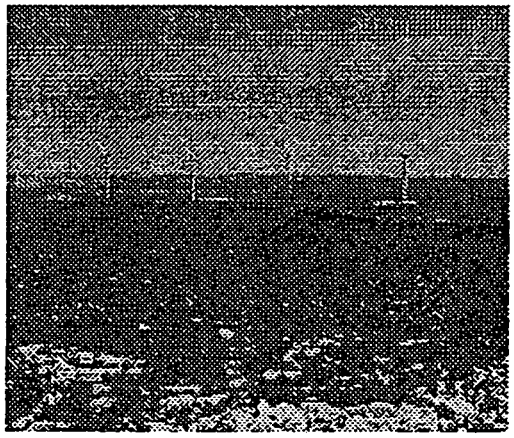
- News Releases
- Financial Releases
- Subscribe to AEP News
- AEP Facts at a glance
- AEP leadership
- History of AEP
- Media relations contacts

AEP ACQUIRES INDIAN MESA WIND PROJECT FACILITIES

COLUMBUS, OH, Dec. 31, 2001 - American Electric Power (NYSE: AEP) announced today that it has acquired the 160-megawatt Indian Mesa Wind Power Project from Enron Wind Corp. of California.

Under terms of the agreement, AEP will also assume responsibility for fulfillment of previously announced power supply arrangements with City Public Service (CPS), the municipal electric utility for San Antonio, Texas. CPS will buy all the power generated from the wind turbines under long-term agreements. Enron Wind will provide operations and maintenance services at the site, located near Iraan, 45 miles east of Fort Stockton.

The addition of the Indian Mesa Wind Project to the AEP generation portfolio establishes the company as one of the largest renewable power generators in the nation. The project, added to the recently completed 150-MW Trent Mesa Wind Project, demonstrates AEP's commitment to strategically increasing its holdings in renewable power resources.



Indian Mesa Wind Project

"We are pleased to add the Indian Mesa Wind Project to our growing fleet of renewable power generation resources," said Dwayne L. Hart, senior vice president of business development for AEP subsidiary, AEP Energy Services. "The addition of Indian Mesa furthers our goal of enhancing the renewable portion of our overall generation portfolio. We're also pleased with the opportunity to establish a relationship with CPS. CPS has been a leader in promoting renewable energy for their consumers in San Antonio."

AEP acquired the Indian Mesa Project for $175 million. The acquisition will be funded internally, but the company intends to seek project financing at a later time. The acquisition will be accretive to earnings.

The project uses 107 Enron Wind 1.5 MW turbines, the largest wind turbine manufactured in the United States, and is capable of providing power to as many as 54,000 residential power users. The project, completed in December 2001, was developed and constructed by Enron Wind, a fully-integrated wind power company which also supplied wind turbines to AEP's Trent Mesa Project. The company manufactures wind turbines in North America, Germany and Spain.

American Electric Power is a multinational energy company based in Columbus, Ohio. AEP owns and operates more than 38,000 megawatts of generating capacity, making it America's largest generator of electricity. The company is also a leading wholesale energy marketer and trader, ranking second in North America in wholesale electricity and wholesale natural gas volume. AEP provides retail electricity to more than 7 million customers worldwide and has holdings in the U.S. and select international markets. Wholly owned subsidiaries are involved in power engineering and construction services.

The comments set forth above include forward-looking statements within the meaning of Section 21E of the Securities Exchange Act of 1934, including (1) statements concerning the Company's plans, objectives, expected performance

and expenditures and (2) other statements that are other than statements of historical fact. These forward-looking statements reflect assumptions, and involve a number of risks and uncertainties. Among the factors that could cause actual results to differ materially from forward-looking statements are electric load and customer growth, abnormal weather conditions, availability of generating capacity, the ability to recover net regulatory assets and other stranded costs in connection with deregulation of generation, the outcome of environmental regulation and litigation, the impact of fluctuation in commodity prices and interest rates, and other risks and unforeseen events over which the Company has no control. The reader is also directed to the Company's periodic filings with the Securities and Exchange Commission for additional factors that may impact the Company's results of operations and financial condition. Furthermore, historical results may not be indicative of the Company's future performance.

Stephen W. Williams (media inquiries)
Corporate Communications Consultant
214/777-2998
Pager: 888/787-1361

Bette Jo Rozsa (analyst inquiries)
Managing Director, Investor Relations
614/223-2840

back to top

Home
Investors | Newsroom | Enviro
Careers | About Us | Contact

Advanced Search | Site Map |

Use of this site constitutes acceptance of the AEP Terms and Conditions.
© 1996-2002 American Electric Power. All Rights Reserved.

News & Press Releases

FOR IMMEDIATE RELEASE

CONTACT: Bob McCullough
(210) 353-2344

January 16, 2002

CPS BEGINS RECEIVING WIND-POWERED ELECTRICITY

Today is the fifth day since San Antonio began receiving wind-generated electricity, which on an annual basis is expected to be enough to power 30,000 average residential homes. The electricity is transported via the interconnected statewide electric transmission system from the Indian Mesa Wind Farm project located in west Texas.

CPS has contracted 100% of the output from the wind farm, located near Iraan, 45 miles east of Fort Stockton. This 160-megawatt (MW) wind power project is owned by American Electric Power (AEP), who recently acquired the farm from Enron Wind. CPS has 20-year and 15-year contracts with AEP for both portions of the wind farm.

"Our involvement with wind power and alternative energy demonstrate CPS' long-term commitment to protecting the environment," stated Milton Lee, Interim General Manager and CEO.

Currently, CPS has the highest percentage of renewables in the state. with wind energy capacity representing 4.15% of the utility's electric load, which peaked last summer at 3860 MW.

CPS is among the largest wind power purchasers in the state, according to the American Wind Energy Association. Texas currently has 1172.44 MW of wind energy capacity and has 220 MW planned to come on line in the future.

Indian Mesa now supplies the CPS Windtricity™ program. CPS had previously contracted with Reliant Energy to purchase 600 megawatt-hours (MWH) per month starting April 1, 2000, and that supply arrangement ended on Dec. 31, 2001.

The Indian Mesa project uses 107 Enron Wind 1.5 MW turbines, the largest wind turbine manufactured in the United States, capable of providing power to as many as 30,000 residential power users.

Concrete foundations 18-to-24 feet deep by 11-feet wide, weighing 96 tons each, support the 213-foot tall structure. Strong winds cause the three 115 feet long blades on each turbine to turn and produce 1.5 MW of electricity at peak wind conditions.

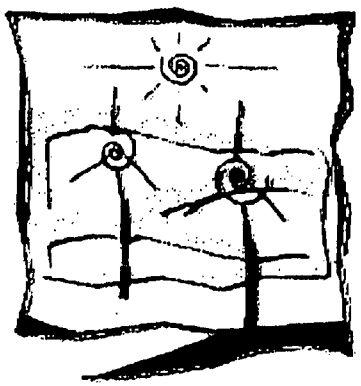
Wind power was first offered to CPS retail customers in April 2000. The CPS Windtricity™ program was a first step toward customer choice in electricity supply. Presently, CPS' Windtricity™ is one of four such programs in Texas and among 89 in the United States. Windtricity™ is available in blocks of 100-kilowatt hours priced at $4 more than the basic price of electricity. Customers can choose the number of blocks up to their total monthly usage.

Electricity powered by the wind is just one of the many alternative energy sources that CPS is investigating. CPS is also one of the founders of the Metropolitan Partnership for Energy which is taking the lead in the region for developing alternative energy sources and energy management techniques for the region. In addition, CPS has a host of pilot projects that are exploring solar power, fuel cell technology and other distributed generation technologies.

Copyright © 2001, 2002, City Public Service. All Rights Reserved. View sitemap. Privacy Policy

Welcome

Desert Sky Wind Project



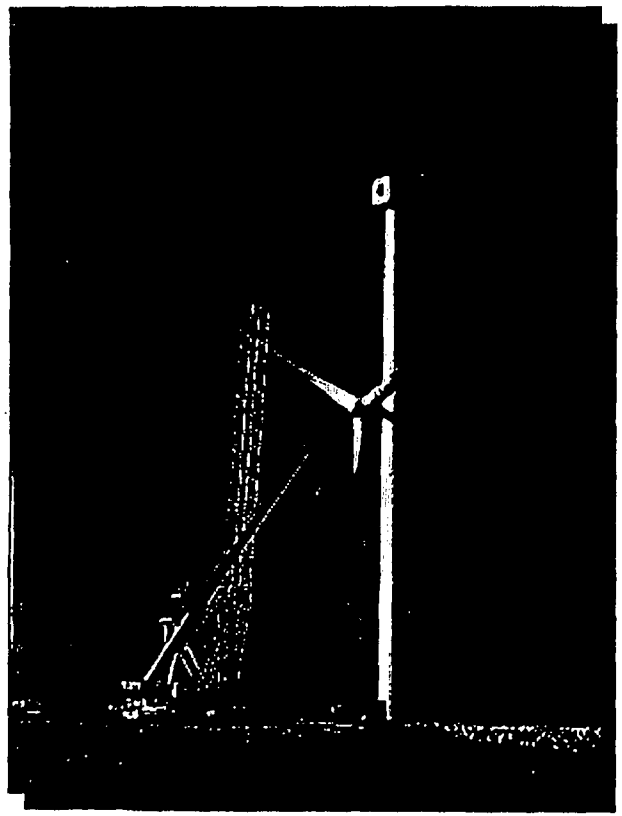
May 2002

Desert Sky Wind Power Project

Wind Power's Place

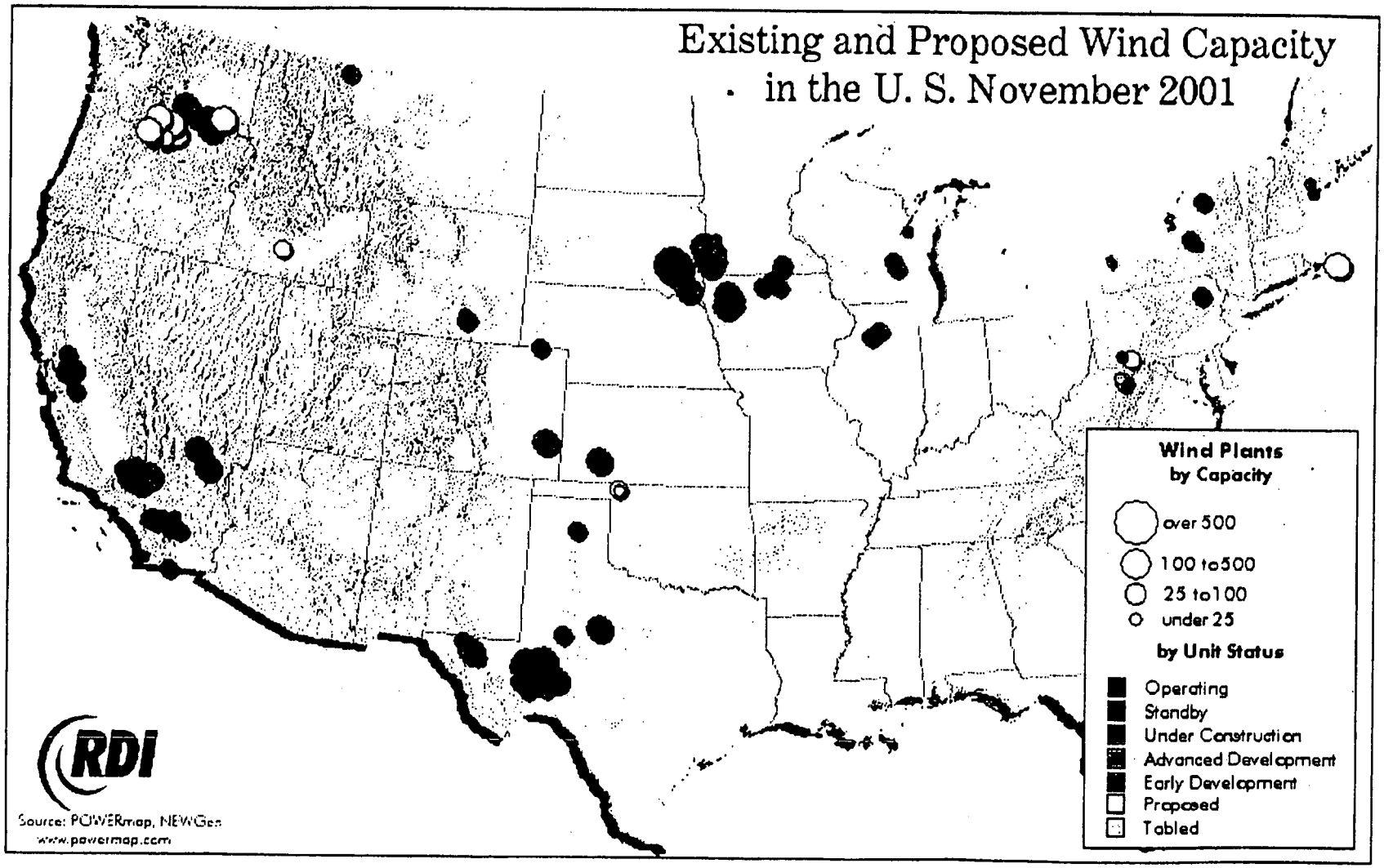
- **Important part of mix**
  - Free fuel
  - No emissions management
- **Maturing technology**
- **Cost competitive**
  - Predictable at proven sites
  - Low risk at proven sites
- **Germany #1, U.S. #2**
- **Fastest growing source**
- **Future looks bright**

Wind Growth 2001



- 1,700 MW in U.S. 2001
- 16 states, Texas leads
- 900 MW in Texas 2001
- More in Texas than entire country in previous years
- U.S. installed capacity total 4,258 MW, 26 states

US Wind Projects



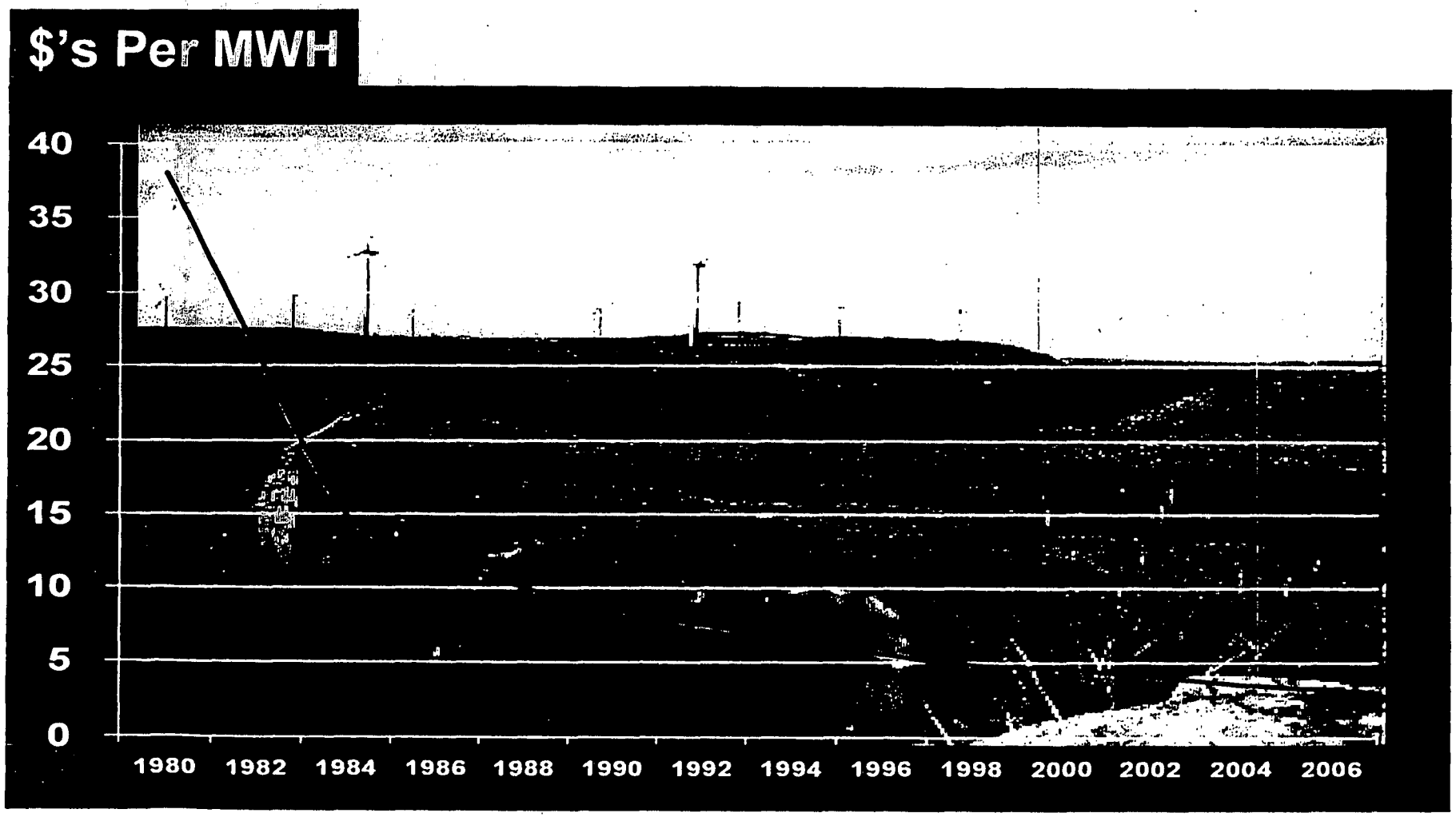
May 2002

Desert Sky Wind Power Project

Wind Industry Drivers

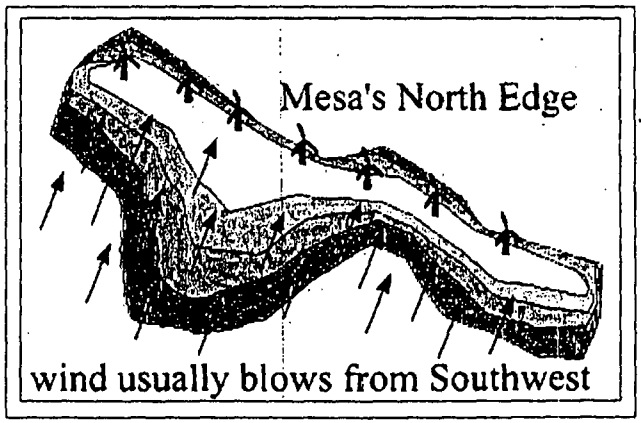
- Low cost
- PTC, 1.7 cents per KWH
- Texas SB 7
- Becoming "mainstream"
- Rural development
- Skilled workforce
- Good remote locations
- Transmission network

Declining Cost of Wind

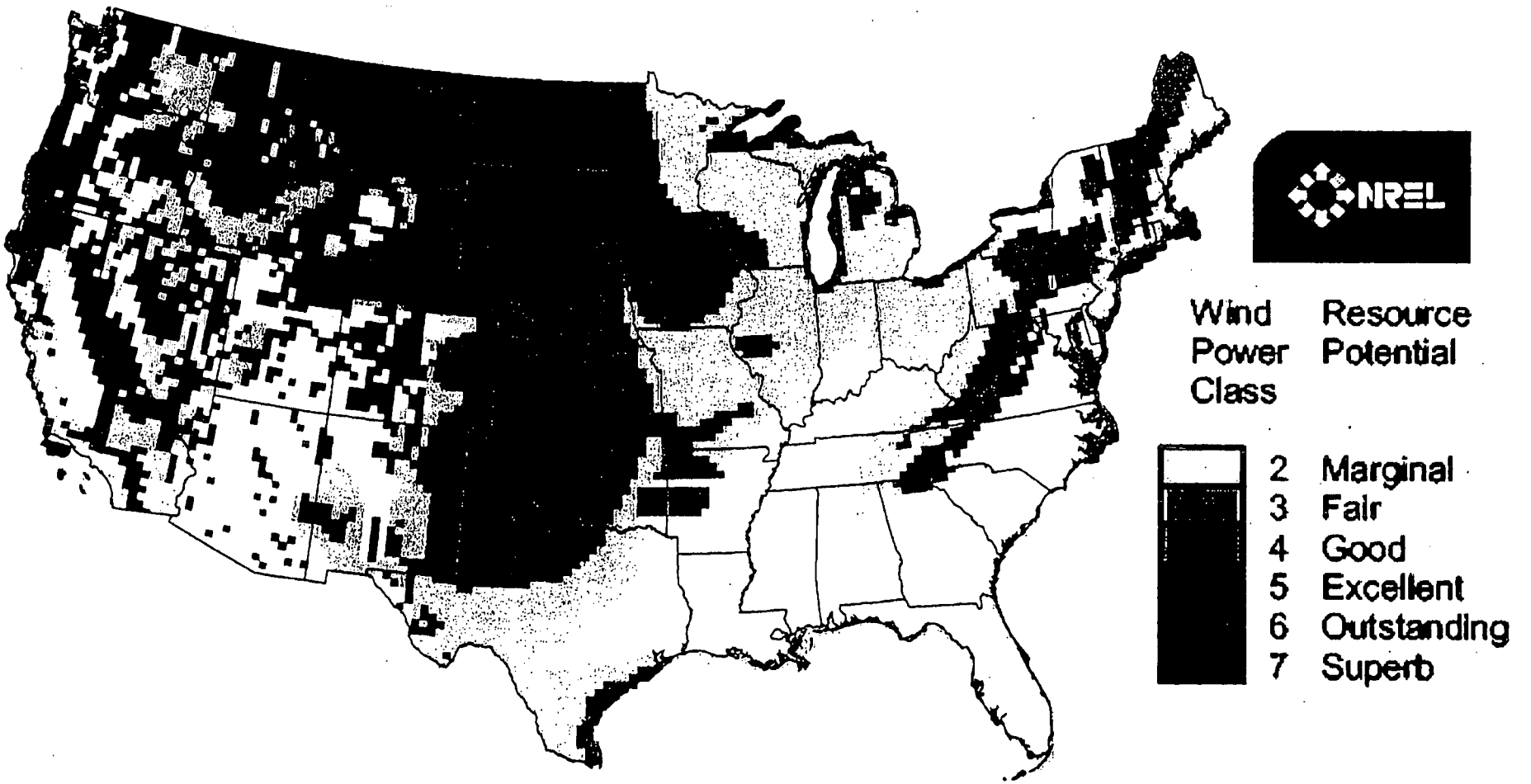


Wind Site Considerations

- ❑ **Willing landowners and public**
- ❑ **Windy site**
  - ❖ 1-5 years of data
  - ❖ mesa
  - ❖ few trees
- ❑ **Lots of land -- rural**
- ❑ **Environmental studies**
  - ❖ Endangered species
  - ❖ Avoid bird flyways
- ❑ **Archaeology studies**
- ❑ **Transmission network**



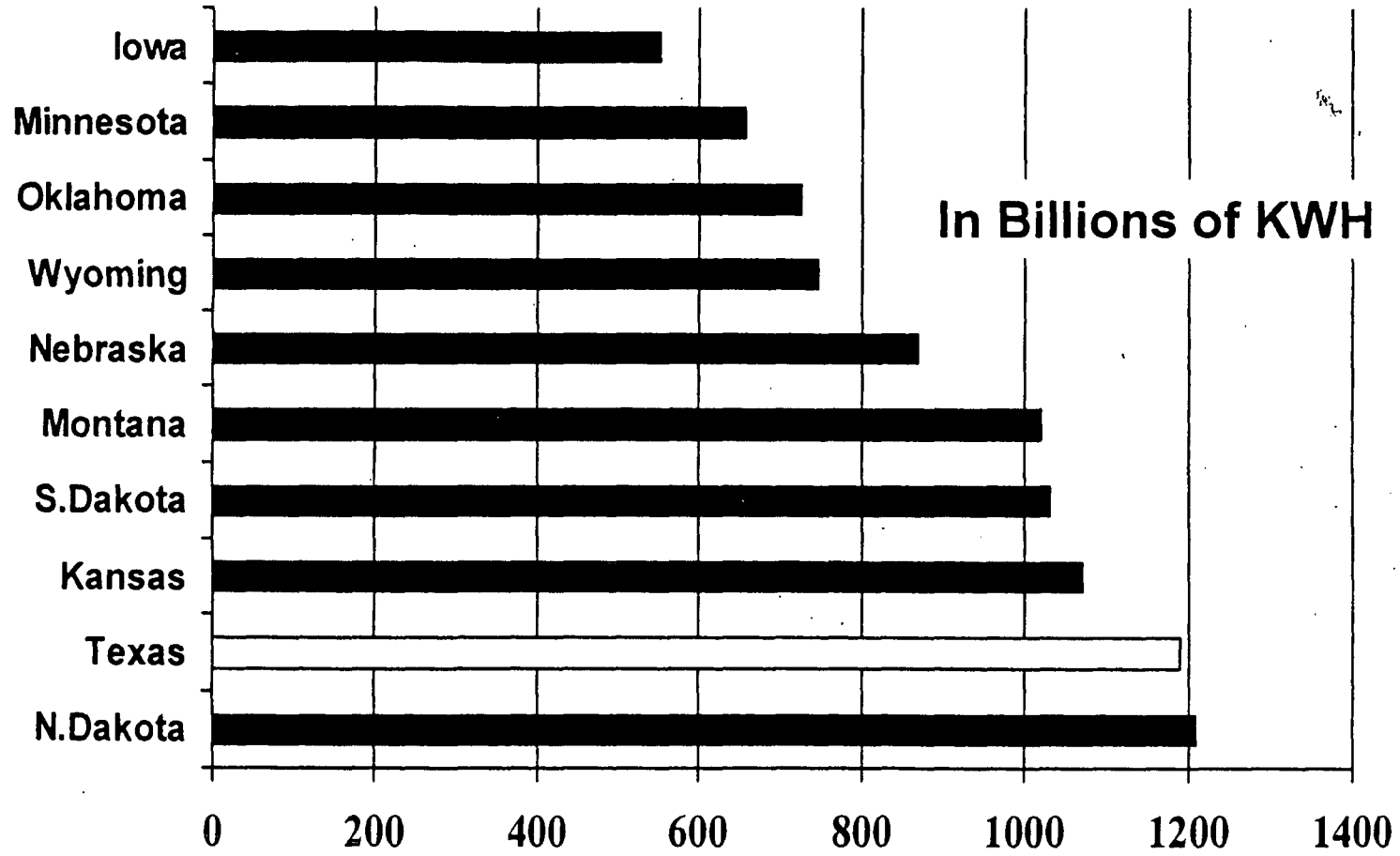
U.S. Wind Resources



May 2002

Desert Sky Wind Power Project

Wind Energy Potential



Desert Sky Wind Project

AEP AMERICAN® ELECTRIC POWER

AEP owns

City Public Service
Committed to the People We Serve™

CPS buying power

Enron Wind built and O&M

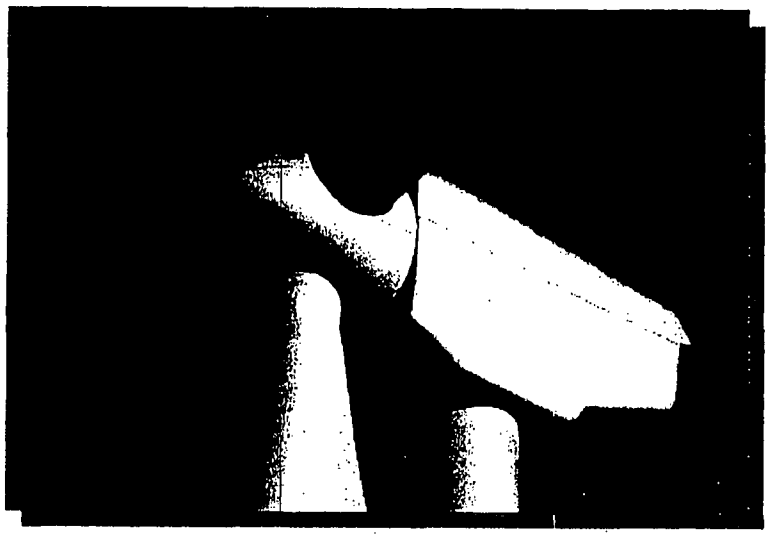
(GE is in the process of buying Enron Wind an April/May transaction is close is expected)

Desert Sky Details

- AEP $175 Million investment
- 107 turbines, Enron Wind 1.5 MW
- Enron Wind O&M
- CPS buys power long-term
- Remote and rural
  - Indian Mesa
  - Pecos County
  - Iraan, Texas
- Project Covers 15 Square Miles

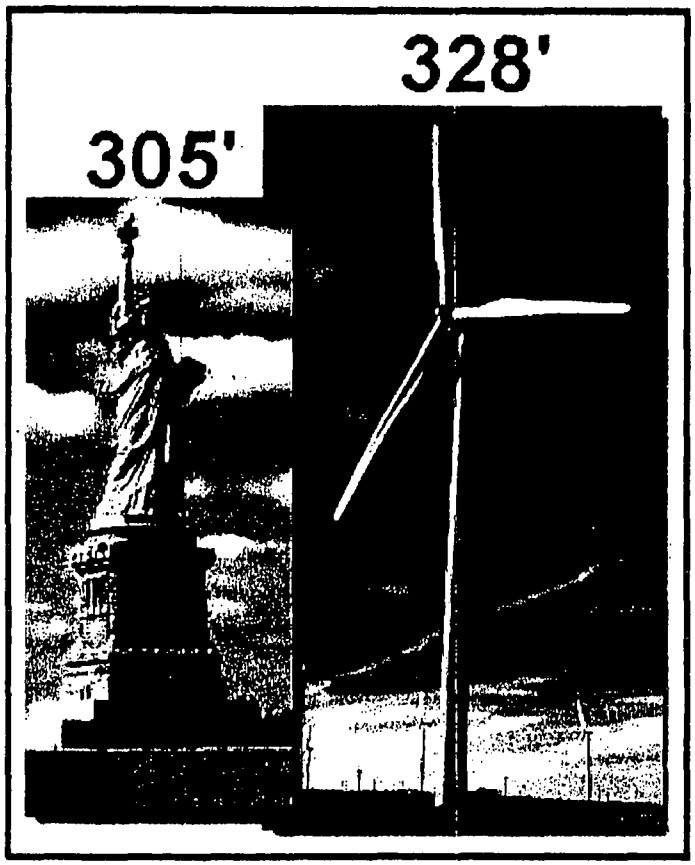
Enron Wind 1.5 Operation

- Operates in 8-56 MPH wind
- Onboard weather station
- Electronically controlled
- Each turbine self-contained
- Desert Sky a 107 unit plant
- Yaw control facing wind
- Variable speed via blade pitch
- Operates at 11-20 RPM



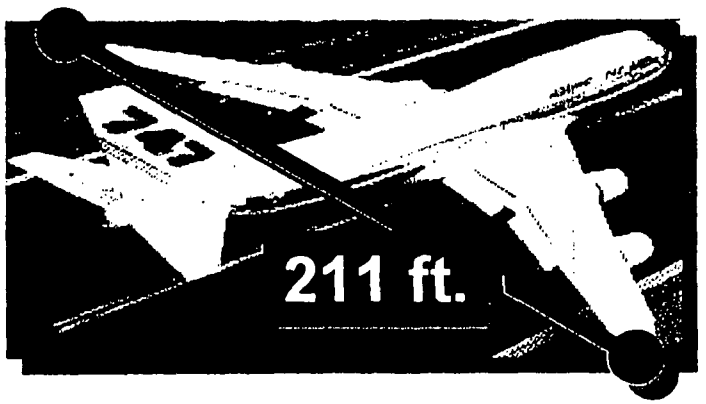
Tower & Turbine Profile

- 328' base to blade
- Each blade 112'
- Span greater than 747
- 163.3 tons total
- Foundation 20' deep
- Rated at 1.5 megawatt
- Supply at least 350 homes

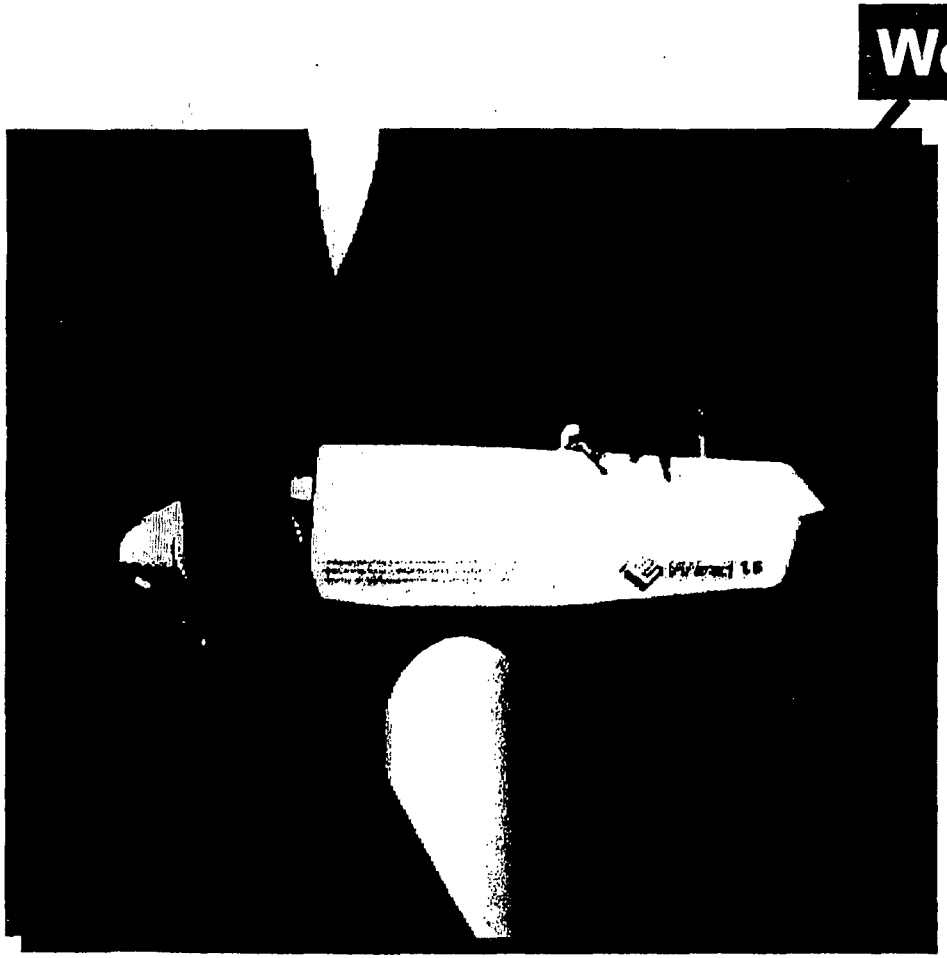


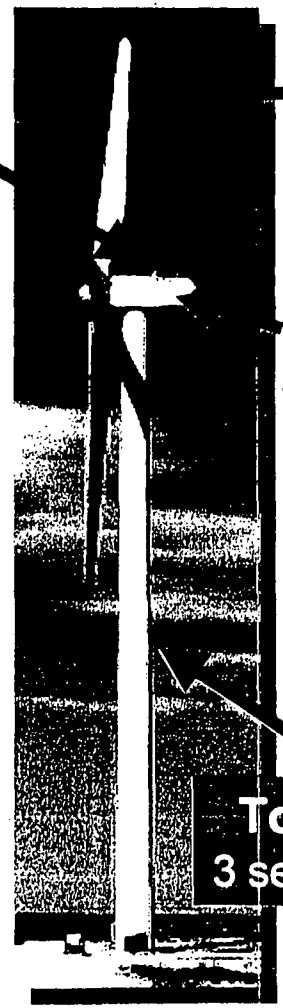
Wide Sweep

- Enron Wind
  - (GE to purchase)
- 1.5 MW turbines
- 231 ft. blade tip to tip



Wind Turbine Units



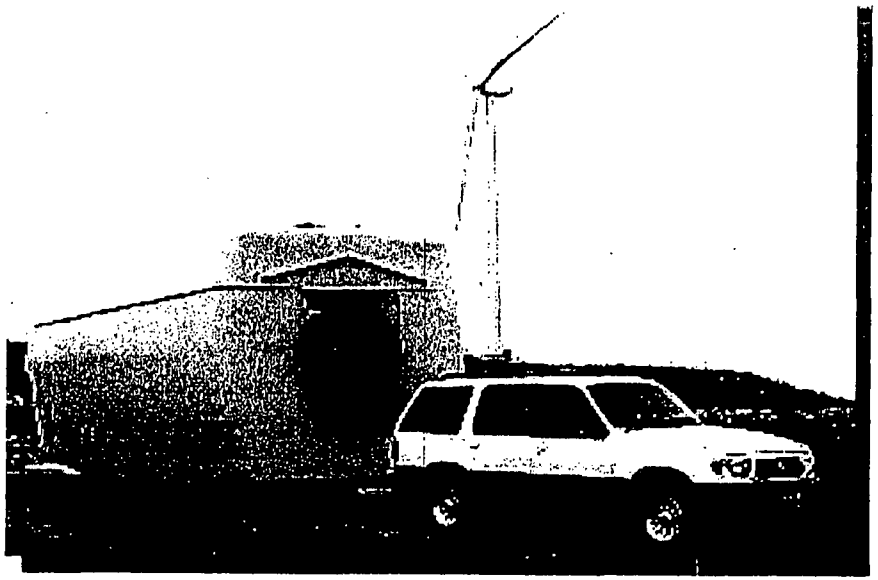


May 2002

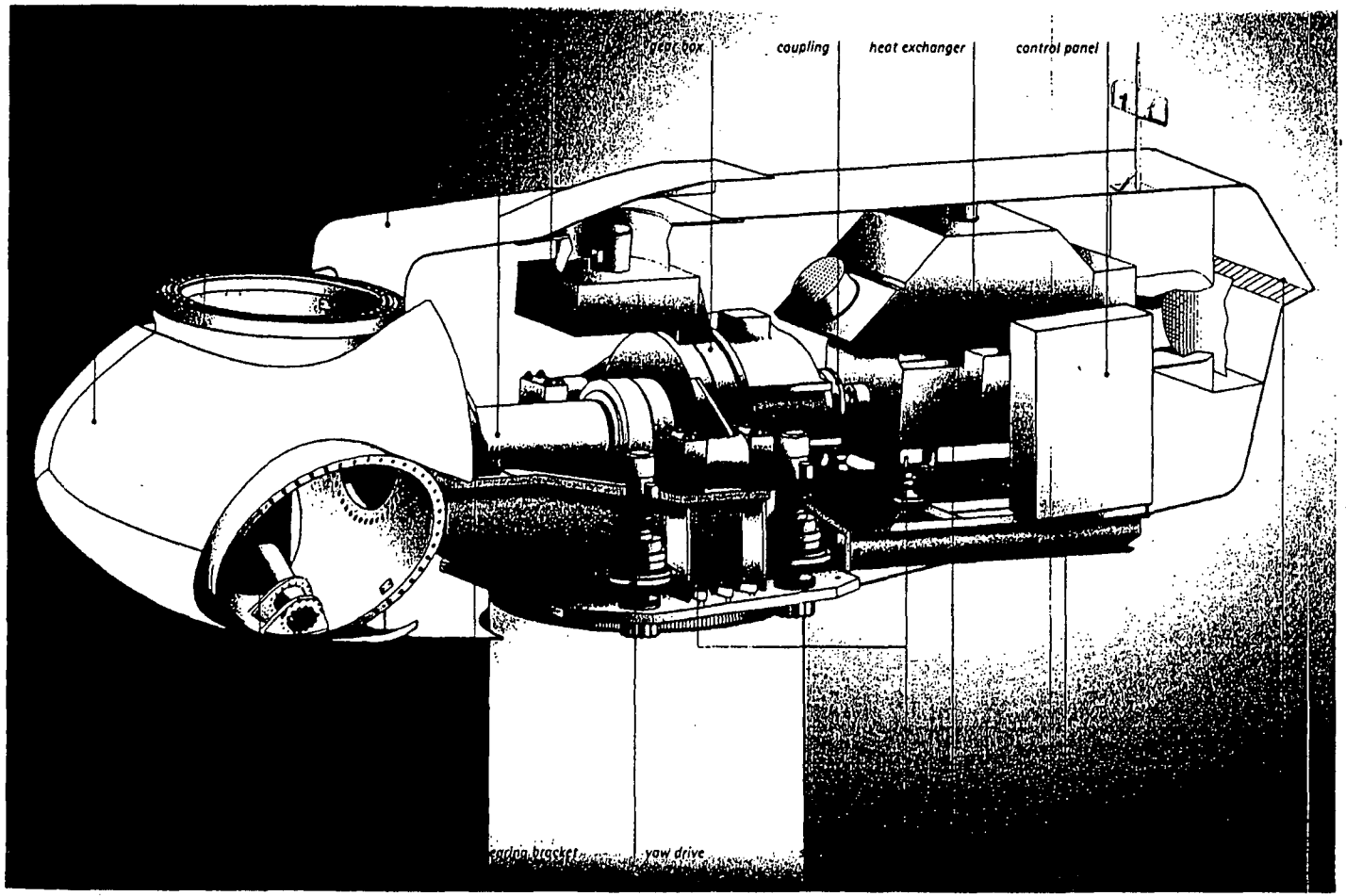
Desert Sky Wind Power Project

Nacelle

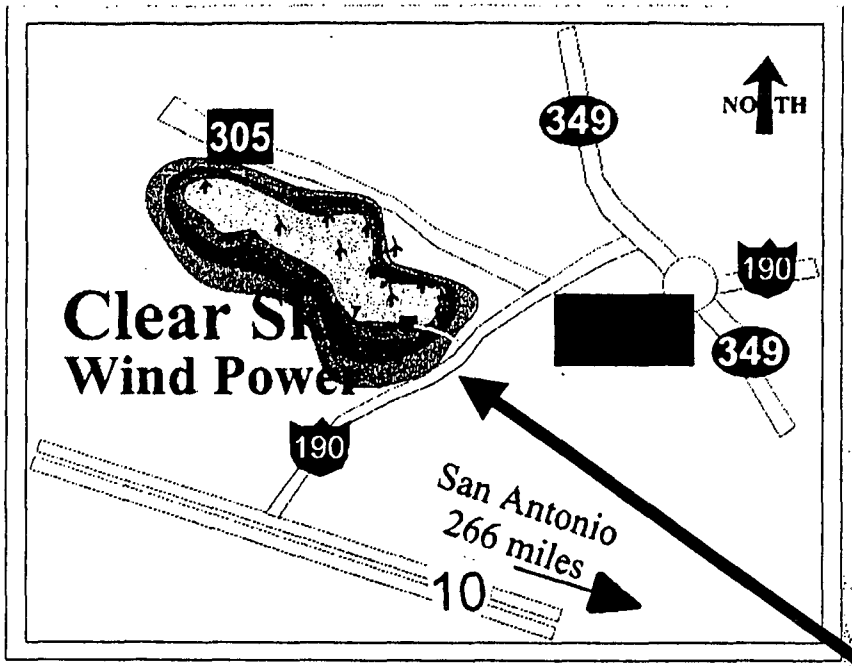
- Nacelle (nuh-cell)
- Houses generator and gearbox
- Resembles large travel trailer
- Weighs 56 tons



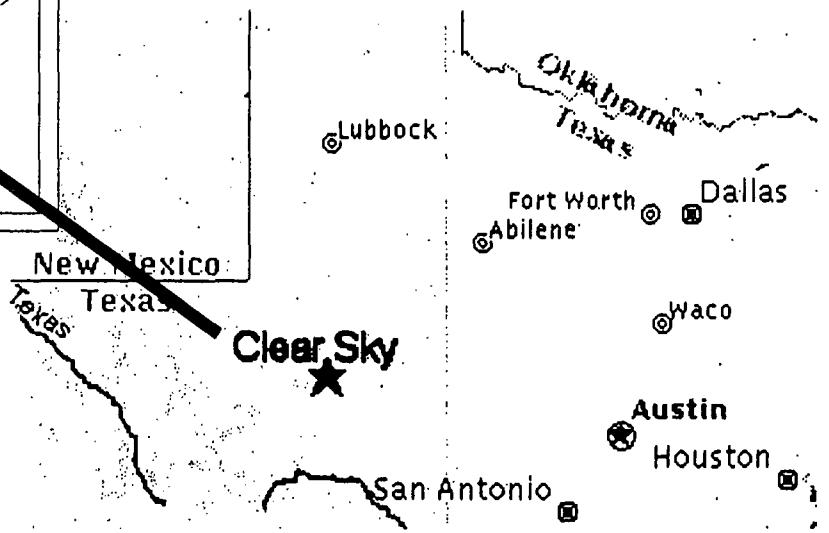
Inside Nacelle



Desert Sky Map



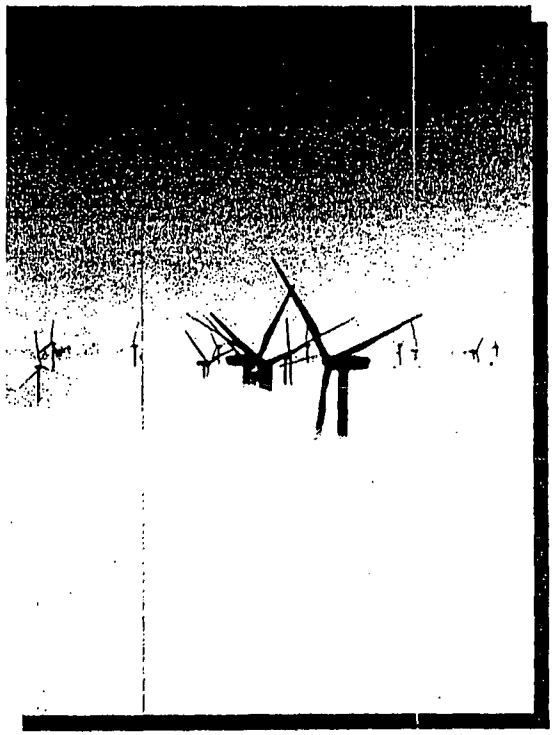
- ❑ Dallas, 400 Miles
- ❑ San Antonio, 266 Miles
- ❑ Odessa, 90 Miles



- ❑ Ft. Stockton, 50 miles
- ❑ McCamey, 20 Miles
- ❑ Iraan, 12 Miles

More Information

- AWEA.ORG
  - American Wind Energy Association
- AEP.COM
  - AEP's web
- CITYPUBLICSERVICE.COM
  - City Public Service
- ENRONWIND.COM
  - Enron Wind
- CLEARSKYWIND.COM
  - Desert Sky Wind



Thank You!

Robert Brewer

06/12/02 10:03 AM

To: #All OIT Fed
cc: Henry Kenchington/EE/DOE@DOE, Scott Richlen/EE/DOE@DOE, Buddy Garland/EE/DOE@DOE
Subject: FOIA request

We have a FOIA request that is due this Thursday. It concerns information relating to any correspondence between DOE and the ENRON Corporation or any of its subsidiaries or executives, including but not limited to Kenneth Lay, Linda Robertson, Jeffery Skilling, and Andrew Fastow from 1999 to March 2002.

Denise and I are personally unaware of any correspondence. PADS and MARS/FIS shows no funded work with ENRON. Please advise of you are aware of any correspondence. If so, please provide copies for the FOIA request. Since I will be at a management off-site tomorrow and Denise will be on travel, please provide your responses to both Scott and Hank.

Thanks.

97

David Salem
06/12/02 10:50 AM

To: Henry Kenchington/EE/DOE@DOE
cc:
Subject: FOIA request

Hank,

This is in response to Bob Brewer's attached note.

In August thru October of 2001 I had telephone correspondence with an Enron employee who volunteered to speak on Energy Efficiency during a DOE hosted breakout session at the October 2001 Chem Show in New York City. During that event, a short presentation was given by Enron. I'll be glad to provide more info if required. (Attached. See E-Mail from Bill Choate, 6-14-02)

Regards,

David Salem
US Department of Energy
1000 Independence Ave, SW
Washington, D.C. 20585
Ph: (202) 586-8710
Fx: (202) 586-3237
----- Forwarded by David Salem/EE/DOE on 06/12/02 10:45 AM -----

Robert Brewer
06/12/02 10:03 AM

To: #All OIT Fed
cc: Henry Kenchington/EE/DOE@DOE, Scott Richlen/EE/DOE@DOE, Buddy Garland/EE/DOE@DOE
Subject: FOIA request

We have a FOIA request that is due this Thursday. It concerns information relating to any correspondence between DOE and the ENRON Corporation or any of its subsidiaries or executives, including but not limited to Kenneth Lay, Linda Robertson, Jeffery Skilling, and Andrew Fastow from 1999 to March 2002.

Denise and I are personally unaware of any correspondence. PADS and MARS/FIS shows no funded work with ENRON. Please advise of you are aware of any correspondence. If so, please provide copies for the FOIA request. Since I will be at a management off-site tomorrow and Denise will be on travel, please provide your responses to both Scott and Hank.

Thanks.

"David Raynor" <draynor@bcs-hq.com>

06/12/02 02:22 PM

To: "Hank Kenchington" <Henry.Kenchington@EE.DOE.GOV>
cc: "Ken Boras" <KBoras@bcs-hq.com>, rguida@bcs-hq.com
Subject: RE: FOIA request - urgent request

Hank,

There is no mention in OITIS of Kenneth Lay, Linda Robertson, Jeffery Skilling, or Andrew Fastow; none of them are users or are listed as points of contact. Also, the Enron Corporation itself is not within OITIS in the list of partner companies or performing organizations and has received no funding from OIT.

Enron is only mentioned once, in the description of project #1583, "Thermophotovoltaic Electric Power Generation Using Exhaust Heat". They are not directly involved in carrying out the project. They are listed as one of the potential companies to be contacted about demonstrating the technology.

Project description:
"The objective of this project is to build a thermophotovoltaic (TPV) cylinder heated externally with a water-cooled TPV array inside. JX Crystals has developed TPV systems with burners that heat an emitter surrounded by TPV cells. For this project, the heat source is the exhaust stream from an industrial process, so that TPV geometry will be inverted and the circuits will be placed inside an emitter tube. JX Crystals plans to demonstrate the production of 1.5 W/cm2 of electricity and a TPV efficiency of 20%. Additionally, Enron and other companies in the glass, steel and metalcasting industries will be contacted in order to familiarize them with TPV and to enlist their support in integrating TPV technology into their processes."

That is the only mention of Enron within OITIS. I don't know any of their other executives or subsidiaries, but can check for particular names as needed.

Dave R.

-----Original Message-----
From: Rob Guida [mailto:rguida@bcs-hq.com]

Sent: Wednesday, June 12, 2002 12:37 PM
To: 'David Raynor'
Cc: Ken Boras
Subject: FW: FOIA request - urgent request
Importance: High

Dave,
This just came in and is a high priority. Please get to Hank today.

R

-----Original Message-----
From: Henry.Kenchington@EE.DOE.GOV
[mailto:Henry.Kenchington@EE.DOE.GOV]

Sent: Wednesday, June 12, 2002 10:25 AM
To: boras@clark.net; rguida@bcs-hq.com
Subject: FOIA request - urgent request

Rob - can you search OITIS for "Enron" and the other names to see if we
have any info during the time period indicated - Pls advise asap - hank

----- Forwarded by Henry Kenchington/EE/DOE on 06/12/02 10:21 AM -----

Robert Brewer

To: #All OIT Fed

06/12/02 10:03 AM

cc: Henry Kenchington/EE/DOE@DOE, Scott Richlen/EE/DOE@DOE, Buddy Garland/EE/DOE@DOE

Subject: FOIA request

We have a FOIA request that is due this Thursday. It concerns
information
relating to any correspondence between DOE and the ENRON Corporation or
any
of its subsidiaries or executives, including but not limited to Kenneth
Lay, Linda Robertson, Jeffery Skilling, and Andrew Fastow from 1999 to
March 2002.

Denise and I are personally unaware of any correspondence. PADS and
MARS/FIS shows no funded work with ENRON. Please advise of you are
aware
of any correspondence. If so, please provide copies for the

FOIA
request.
Since I will be at a management off-site tomorrow and Denise will be on
travel, please provide your responses to both Scott and Hank.

Thanks.

"Bill Choate"
<bchoate@bcs-hq.com
>

06/14/2002 09:28 AM
Please respond to
bchoate

To: robbie.dooms@ee.doe.gov
cc: "David Salem" <david.salem@ee.doe.gov>
Subject: ChemShow Session with Enron Energy Services speaker

Ms. Dooms,

David Salem of OIT asked that I forward information on the Energy Efficiency Session that OIT chaired at the 2001 ChemShow in NYC. Michael Mann of Enron Energy Services was one of the session speakers. The session agenda with topic briefs and speaker bios is attached.

If you need additional information please contact me.

Regards,
Bill

William T. Choate
Project Manager / Senior Technical Staff
BCS, Incorporated
5550 Sterrett Place Suite 306
Columbia, MD 21044
(410) 997-7778 ext. 14
(301) 621- 5535 ext. 14 (local DC)
(410) 997-7669 fax
bchoate@bcs-hq.com

www.bcs-hq.com

ChemSession-01.wp

ChemShow Session

"Energy Efficiency - Reducing Production Costs"

Tuesday, October 23 9:00 to noon

Time	Title	Presenter	Organization
9:00	Introductions Energy Efficient Programs	David Salem (202) 586-8710 david.salem@ee.doe.gov	Department of Energy Office of Industrial Technology EE-20 1000 Independence SW Washington, D.C. 20585
9:10	Boiler Efficiency vs. Steam Quality: The Challenge of Creating Quality Steam using Existing Boiler Efficiencies	Glenn Hahn Technology Manager (610) 606-7087 ghahn@spirax.com	Spirax Sarco, Inc. Allen Town, PA
9:40	A Road Map for Long Term Energy Savings	Michael Rutkowski President (703) 435-7881 michael_rutkowski@compuserve.com	Veritech Sterling, VA
10:10	Strategic Energy Risk Management Solutions	Michael Mann Vice President of Energy Outsourcing (713) 853-0969 mmann@enron.com	Enron Energy Services
10:40	Break		
11:00	Minimizing Pumping Costs Using Life Cycle Cost Techniques	Ray Hardee Chief Engineer, P.E. (360) 412-0702 ext 102 rayhardee@eng-software.com	Engineered Software, Inc. 4531 Intelco Loop SE Lacey, WA 98503
11:30	Converting Waste Heat Into Profits	Don Ericson President (410) 266-6521 enerconcep@aol.com	Energy Concepts
12:00			

BOILER EFFICIENCY VS. STEAM QUALITY
THE CHALLENGE OF CREATING QUALITY STEAM USING EXISTING BOILER EFFICIENCIES

A boiler works under pressure and it is not possible to see what is happening inside of it. The terms "wet steam" and "carry over" are every day idioms in the steam industry, yet very few people have ever seen these phenomena and the actual water movement inside a boiler has remained highly speculative. This paper and support test video of actual boiler operations will illustrate the effects steam quality vs. boiler efficiency during different boiler and steam system demands.

Biographical Sketch: Glenn Hahn - New Technologies Manager, Spirax Sarco, Inc., Allentown, PA Ghahn@Spirax.com, (610)606-7087 – Glenn joined Spirax Sarco in 1984 after working 15 years with Ingersoll Rand Steam Condenser Division as a Project Engineer, Field Service Engineer and Application Engineer. Glenn in currently the New Technologies Manager with Spirax Sarco (Energy Services Group), a Department of Energy Office of Industrial Technologies "BestPractice Allied Partner", Chairman of BestPractice Steering Committee, an Alliance to Save Energy "Associate Member", a STEAM BESTPRACTICE Steering Committee Member, and Executive Board Operating Sub-Committee Chairman of Steam BP & Technologies, plus an Editorial Board Member for DOE/OIT "ENERGY MATTERS". Glenn has thirty-two years of Steam System Hands-on experience from Training Manager to Application Engineering Manager and forensic engineering, with more than fifteen technical paper presentations and over 10,000 hours of classroom and plant site training to draw his findings from.

A ROAD MAP FOR LONG TERM ENERGY SAVINGS

Each industrial site approaches energy cost management with a unique set of circumstances. Among these is the size of the facility, how energy is used on site and the company's position related to capital investment.

This paper will describe an approach for deciding how to most effectively reduce energy cost for each individual site. Consideration will be given to characterizing the site energy consumption, marginal energy cost calculations, identifying inefficient use of energy and capital investment options, and utilization of monitoring tools to capture "low hanging fruit".

Biographical Sketch: Michael Rutkowski - Mike is president and co-founder of Veritech located in Sterling Virginia. Veritech was formed in 1993 and offers energy management products and services to the process industries. 80% of Veritech's business is with the chemical, petrochemical and oil refining industries. Mike has 25 years of experience in process design and energy management and holds both a Bachelors and Masters degree in Chemical Engineering from Drexel University in Philadelphia.

STRATEGIC ENERGY RISK MANAGEMENT SOLUTIONS

Energy costs affect companies in every industry sector. For the most part, companies managing their energy supply chain are not dealing in an area that is their core competency. They face many risks they haven't planned for, from a fragmented energy infrastructure to volatile pricing. This session will address how a strategic energy risk management plan can help improve energy efficiency, enhance profitability, and protect a company from energy price risks and volatility.

Biographical Sketch: Michael Mann, Vice President of Energy Outsourcing, Enron Energy Services, is

responsible for directing the development of strategic energy management and energy risk management solutions for manufacturing and industrial companies across the country, operating in deregulated and regulated energy markets. Enron Energy Services provides such products and services as electricity and natural gas supply, energy efficiency projects, distributed generation and energy information.

Michael has more than 20 years of general management, corporate development, and business development experience in the energy, engineering and construction industry in the U.S. and Europe. He was the primary originator for the first major industrial to partner with Enron, Owens Corning, which represented more than $1.3 billion in total contract value. Most recently, he was responsible for negotiating partnerships with Owens Illinois, Eli Lilly, Pilkington, and other major corporations.

Prior to joining Enron in 1998, Michael was responsible for major project development opportunities at Fluor Daniel, as well as executing the strategic turn-around of specific business units in the U.S. and Europe.

MINIMIZING PUMPING COSTS USING LIFE CYCLE COST TECHNIQUES

When selecting a pump for a fluid piping system the pump is purchased based on its ability to meet a given design point of head and flow rate. For a given design point multiple pumps can be meet the pumping needs. In the past the primary consideration for selecting a pump has been either the initial pump cost, or in some cases choosing a pump with the best efficiency at the design point.

There are additional expenses that occur during the life of the pump that should be considered when selecting a pump. They include energy cost, maintenance cost (both scheduled and unscheduled), support services and training.

This paper describes how Life Cycle Cost Techniques can be used to determine the most cost effective pump to use in a pumping application. Since energy cost is such a large part of the lifetime pumping cost this paper concentrates on that aspect of the Life Cycle Cost.

Biographical Sketch: Ray Hardee - P.E. is one of the Chief Engineer and one of the founders Chief of Engineered Software in Lacey Washington.

For the past 18 years Engineered Software has been involved in developing PIPE-FLO, fluid flow software used to model the operation of fluid piping system. While working in this field he has taught classes on Using Software to troubles shoot fluid piping system, and has written many articles dealing with the interaction of pumps, controls, and pipelines within fluid piping systems.

Mr. Hardee was a member of the joint Hydraulic Institute, EuroPump committee for the development of "Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems".

He graduated from the United States Merchant Marine Academy with a degree in Marine Engineering. After graduation he was a Naval Officer qualified in Submarines. He worked for Ebasco Services for 10 years as a startup and test engineer before starting Engineered Software.

Converting Waste Heat Into Profits --

New developments in absorption cycle technology plus higher utility prices have greatly expanded the opportunities for converting waste heat into profits.

Absorption refrigeration and air conditioning are now less costly than ever, and can use lower waste heat temperatures. The same cycle can be used to produce power, at greater efficiency than traditional power cycles.

Biographical Sketch: Donald C. Erickson is the President and founder of Energy Concepts Co., LLC, a leading developer of advanced ammonia absorption cycles and related technology. Mr. Erickson has authored over 200 articles and patents, and Energy Concepts has fielded numerous landmark and award-winning absorption projects.